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WRITTEN SO YOU CAN UNDERSTAND IT

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Automatic Burglar Alarm Phones for Help

HEREAFTER armed robbers that enter a bank and "cover" the cashiers with revolvers, preparatory to gathering up the money, may find that they are not as secure from attack as the submissive men in front of them would indicate, for the bank may be protected with a recently devised secret signal system that automatically telephones for help in such an emergency. To operate this alarm one has only to press a hidden electric button with his foot or knee — an act that would be unnoticed by the plunderers. All the apparatus, save the button, is located in another room, or in a cabinet, out of hearing of the bandits. Pressing the button causes a lifting device to raise the receiver hook of a telephone, by means of a cord, thus making connection with central. Simultaneously, a small-size phonograph, situated in front of the telephone transmitter, begins to operate, repeating again and again some such message as this: "Help! Robbers! Send police to Third National Bank!" The telephone girl, on hearing this appeal, will immediately notify the police. An obvious advantage of this system is that the robbers are wholly unaware that any alarm has been turned in and so their capture is much more probable. Another type of this protective device is provided with a buzzer, in the place of a phonograph, which sounds into the telephone. The apparatus can be connected so that if a bank is entered after closing hours, the signal will operate without the pressing of any button. A similar mechanism has been devised which automatically notifies central in case of fire in a building.

A Burglar Alarm That Talks: The Button near the Cashier's Knee Enables Him Secretly to Set the Phonographic Alarm to Operating in an Adjoining Room

CONVENIENT HAIR DRIER FOR WOMEN'S USE

Women often experience difficulty in drying their hair after washing it, especially in the winter time, when the

This New and Convenient Hair-Drying Device, Invented by a Woman, Seems to Solve One of Woman's Minor Problems, Especially in Winter

sunny back porch and other summer facilities are not available. This difficulty is overcome by the recent invention of a Chicago woman. This consists of a tubular elbow of sheet metal, resembling stovepipe, which can be placed on the top of any range, over a lighted burner, and will direct heat as desired from the burner to the loose hair of a person seated near the range. The elbow forms a right angle, with one side longer than the other, to suit persons of different heights. It has a flange at each end, for fastening it to the range and directing the heat, also a convenient handle.

COLD WEATHER BRINGS BIG PROBLEMS TO RAILROADS

Something of the magnitude of the problems that arise in railroad operation because of low winter temperatures is revealed in a bulletin issued by the New York Central Lines to its chief engineers, superintendents, etc. The pamphlet shows that the temperatures and precipitation for each month in the various important stations on its lines are carefully tabulated. A scientific study of these records, covering several years, enables the road to issue general forecasts which are a material aid in preparing the track and the equipment for approaching cold weather. The bulletin referred to shows that the abnormally cold winter of 1911-12 caused the greatest number of broken rails in the history of the transportation company and also that an unusual number of wheels gave out. While such extreme cold does not occur frequently, it was deemed advisable to make improvements so that when the severe test does come, it could be met without serious interruption of traffic. Consequently the New York Central Lines laid no less than 900,000 tons of basic open-hearth steel rails, in the place of those among which were so many defectives, and a vast number of old wheels were replaced by solid steel wheels.

EASTERN FOOTBALL TROPHY A STRIKING STATUE

Intense vigor is depicted in every line of the statue which is to be awarded to the football team that wins the eastern-university championship in 1917. The figure is that of a football player dressed in all his gridiron "togs," and shows him the instant after he has delivered a powerful kick to the ball. In portraying this difficult posture the sculptor has produced a work of art which is suggestive of the highest football development

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¶Over 80,000 lb. of aluminum has been recovered in Ontario for munition making by substituting copper wire for aluminum wire on the main transmission lines of the Ontario hydroelectric commission.

RAPID TRANSIT IN MID-AIR

By J. E. MURPHY

THAT aerial rapid transit connecting the roofs of the skyscrapers in cities like Chicago and New York will be the next transportation problem to demand solution was freely predicted at a recent convention of owners and managers representing the bulk of the big building interests of the United States. Congestion on the streets and on the elevated and surface lines, while important in itself, is not the only consideration leading to this conclusion. Time and convenience are the essential things. What is needed is a system of transportation that will make it unnecessary for a business man to take an elevator at an upper floor of a skyscraper, descend to ground level, and, after encountering the crowds on the streets, take an elevator in another skyscraper to reach perhaps the same level that he started from.

Plans for connecting adjacent skyscrapers by means of aerial tramcars running on cables and operated by haulage cables, such as are now in use for reaching several peaks of the Alps, have already been definitely proposed. The requirements of city transportation, however, make such a system wholly inadequate. The only plan that will prove satisfactory is one that

The Type of Construction Feasible for Skyscraper Transit Lines: Elevators would Serve the Tower and Roof Stations and Much Traffic would be Diverted from the Streets

provides a complete and dependable aerial rapid-transit system serving the entire skyscraper district. In Chicago, for example, if it is to be a practical success, such a system must virtually duplicate the surface lines of the loop district, in addition to providing a number of diagonal lines for giving quick access to the railway stations.

Novel as this proposition may seem, it is simply a problem in finance and engineering design. There is little doubt that a satisfactory solution of the engineering problem can be found if certain restrictions and requirements are observed. Cars suspended from sagging cables, like those of the Alps, would be clearly out of the question, for where there is a sag in the cable there is a sharp summit to be passed at each support. To make fast running safe, or even possible, it will be necessary to provide a supporting structure so rigid that there will be no appreciable sag under the weight of a loaded car. On the other hand, any type of trussed bridge construction such as is used for railways will impose too great a load on the buildings, and it is the buildings themselves that must furnish the support for the aerial structure. The same consideration evidently makes it necessary to suspend the cars from the running rails, as any plan for operating the cars above the rails will require a heavy floor system made of steel girders and floor beams. In addition to these requirements, the cars must be self-propelled, just as are surface-line cars, and must operate on double-track lines.

While it is impossible to say in advance of actual design just what the form of the aerial structure will be, there is at least one construction that meets all these requirements. This is a simplified suspension-bridge span. With this type of construction all the members of the span will be in tension and the span need have only a fraction of the weight that is necessary when compression members are used. A 2-in. cable made of the best steel, for example, will resist a pull of more than a hundred tons, but the same cable placed under compression will buckle with the application of a few hundred pounds. The spans for each track might be made either single or double, as either construction would furnish satisfactory support.

Assuming that the single span, because of its simplicity, is the one to be adopted, the next question would be that of attaching the running rails. This could be .done by means of brackets having roughly the form of an inverted "T" and suspended from the lower chord of the span, one rail being supported on each of the projecting arms of this bracket. Since the brackets would be located between the rails, an individual axle, acting as a revolving cantilever beam, would be required for each of the wheels. Here, again, the problem would simply be one of engineering design. A long bearing would be required and it would be necessary to make the axles of somewhat greater diameter than if each pair of wheels were mounted in the usual way on a single axle. Each axle would be mounted in a bracket extending upward from the framing of the car, and within this bracket would be housed the motor for propelling the wheel. Arranging the power or "third" rail is the easiest feature of the construction, as this could be attached to the lower side of the inverted "T" bracket, in convenient position for the contact shoe.

Steel towers springing from the roofs of the buildings would furnish support for the aerial spans. These towers might be rectangular in section to a point well above the running rails, and above this level would probably taper practically to a point. The cars would pass through openings in the towers.

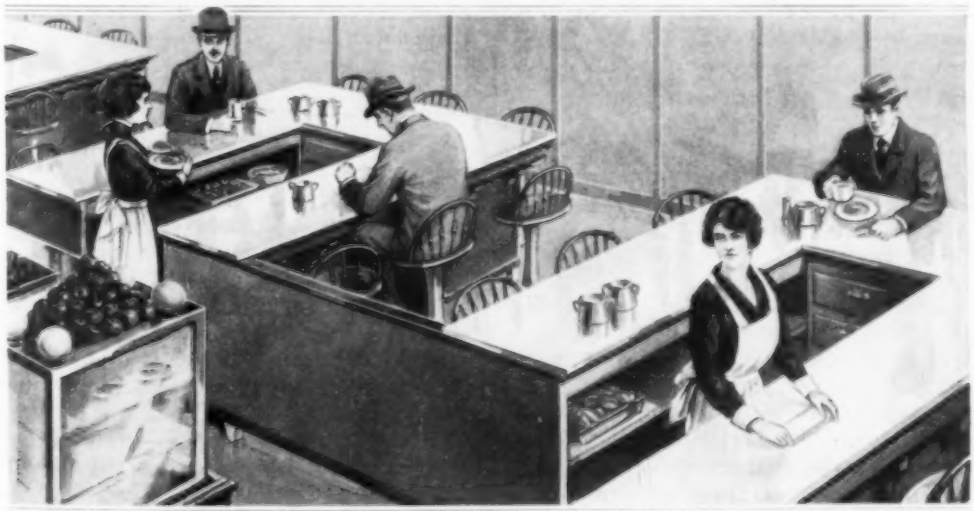
Under the building ordinance of Chicago the height limit is now 200 ft. Prior to 1911 the limit was 260 ft., and a great many of the buildings of the loop district are built to this level. Grades might be put in in places, but the aerial lines would as a rule be built to correspond to the high level. The difference of 60 ft. would therefore be

the determining factor in the height of most of the towers and stations erected on the lower buildings. The station could be installed directly on the roof of a high building, and one or more of the elevators already in service in the building could be arranged to run to a cabin on the roof. With the lower buildings it would be necessary to support the station platforms on steel trestles, with elevators for reaching the platforms.

In New York there are a number of buildings, such as the Singer Building with its 41 stories, and the Woolworth Building with its 55 stories, that it would be practically impossible to reach the top of with an aerial line. In such cases the line could be run through the building at the twentieth or thirtieth-floor level. In Chicago the situation is more favorable, there being a surprising regularity in the sky lines of the principal streets of the loop district. In few cases would spans of more than 200 ft. be required. In a steel span of this length the expansion or contraction due to heat and cold would amount to about 1½ in. for a change of 100°. No serious difficulty would be caused by twice this variation in length of span. There would be no necessity for "grade" crossings. North and south and east and west lines would undoubtedly be built at different levels, while the diagonal lines could be built at a third level. All could be served by the same stations, with the same elevators running to the three platform levels.

LUNCH COUNTERS DESIGNED IN NOVEL STYLE

By an ingenious arrangement of his lunch counters a Chicago restaurant man has effected a saving of about 18 per cent of the space required to feed a given number of patrons, besides giving each customer plenty of elbow room and enabling the girl waiters to do their work in greater comfort. The space usually occupied by long straight counters is broken up into sections, each forming three sides of a rectangle, with three pivoted stools to a side, leaving a clear space in the middle of the rectangle for the waiter, who thus has nine persons to serve when the seats are filled. Each stool has a comfortable low back, and the new arrangement, which accommodates over



Novel Arrangement of Seats in a Chicago Lunch Room: Each Waitress Has Nine Customers to Serve and a Clear Space to Work between Them. The Plan was Designed by the Proprietor

90 customers at a time, is said to work well, especially during the rush incident to the noon and supper hours in one of the busiest streets of Chicago's retail district.

FRUIT PICKER'S TRAY SAVES USER'S TIME

Rapid picking of berries or other fruit is made possible by using a recently patented tray which is held in

Fruit Picker's Curved Tray Having Raised Edges and Held in Place by Shoulder Straps so That Both Hands can be Used in Picking

front of the wearer by straps extending around the waist and over the shoulders. It is curved to conform to the shape of the body and has raised edges that prevent the baskets set on it from sliding off. The device permits the use of both hands, and its capacity is such that time is not lost in frequently stopping work to renew one's supply of empty containers.

ALWAYS LUMINOUS PAINT FOR LIGHT SWITCHES

A compound which is continuously self-luminous is to be used by a large firm in the manufacture of electric-light switches, and the like, so that they may be easily found in the dark. This "radium paint," as it has been called, should not be confused with substances now on the market which are luminous only after being exposed to the light for several hours. The new preparation contains a small quantity of radium bromide which, in the dark, gives the paint about the brightness of a rubbed sulphur match. On aeroplane compasses a luminous compound is used that shines quite brilliantly, but it contains such a large percentage of radium that it rapidly disintegrates the zinc sulphide contained in it so that it lasts only about a year, whereas this preparation for switches will last for 10 to 15 years, it is said. For switches already installed it is proposed to supply luminous-head screws which would reveal the position of a switch in the dark.

FAMOUS TENNESSEE CAVES BEING DEVELOPED

The development of two historic caverns in Tennessee, known as Arch Cave and Bone Cave, in Van Buren County, is now in progress. During the Civil War Confederate recruits are said to have been secretly mustered into service in Arch Cave, while Federal troops scoured the territory overhead. One room in this vast underground area is known as the "Muster Ground." It has a level floor, is 60 ft. wide and 300 ft. long, and is surmounted by a symmetrical oval dome. On at least one occasion, southern soldiers took refuge in these subterranean passages when hard pressed by the northern army. Until the Civil War broke out, the caves were inhabited by vast numbers of bats, and it is estimated that thousands of tons of bat guano, rich in potash and ammonia, have accumulated there.

FARRAGUT'S FLAGSHIP WITH CANVAS SPREAD

"OLD Salamander" was the popular title that David Farragut, the first admiral of the United States Navy, won as commander of the "Western Gulf Blockading Squadron" in the days of the secession. His flagship, the "Hartford," that fought its way up the Mississippi with dash and boldness, is the trim little vessel shown under way in the picture above. The boat now serves as a receiving ship and is stationed at the Charleston Navy Yard.

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ELEPHANT ENJOYS BEING VACUUM-CLEANED

A New York show elephant that thoroughly enjoys the sensation of being cleaned, has that part of her toilet attended to in a novel manner. Contrary to the popular notion, "Lena," as she is named, does not care for rolling in dirt, but wails and annoys her keepers unless she is kept clean. An ordinary scrubbing fails to satisfy her, but when her vacuum cleaner appears she plainly manifests her delight and sinks to her knees that the work may be done conveniently. She is ready for the process at any time, and her deportment is especially good on days when the cleaner is regularly used.

Cleaning a Show Elephant by the Vacuum Process: The Huge Animal Willingly Kneels to be Cleaned in This Way and Prefers It to a Scrubbing

NEW SHIP ABLE TO CARRY AMMUNITION OR SUPPLIES

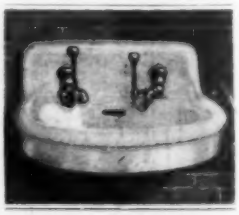
An ammunition ship of a new type is to be built for the navy which will have a displacement of 10,000 tons and will be provided with refrigeration space so that it can be transformed into a supply ship with little alteration. The vessel will be equipped to burn either coal or oil fuel and will be armed with four 5-in. rapid-fire guns and two 3-in. antiaircraft guns.

WHY MOTION PICTURES CAUSE EYESTRAIN

There are more factors involved in the proper presentation of motion pictures than the average person realizes, and if any one of these is not as it should be, it may result in injury to the eyes of those who view the "movies" frequently. This fact has been brought out recently by the acting secretary of the National Committee for the Prevention of Blindness. He has declared that either defective photography, improper illumination, poorly developed films, or inaccurate projection, may subject the eyes to overstrain. Furthermore, constant attendance at motion-picture shows in many cases reveals some weakness of the optics that was unknown before. Favorable conditions for the eyes can be obtained by having the theater as light as possible, by sitting directly in front of the screen, and by selecting a seat as far back as possible.

BUBBLE FOUNTAIN FOR AN ORDINARY FAUCET

Any ordinary faucet can be readily converted into a drinking fountain of the bubble type by means of an ingenious attachment recently devised by a Denver woman. Even when attached, it does not interfere with the customary use of the faucet, as it can be instantly swung to one side when pulled down slightly from the water outlet, with which it has a pressure contact.



Two Views of an Old Church in South Bend, Indiana, being Drawn Five Blocks to a New Site by a Freight Engine

LOCOMOTIVE PULLS CHURCH TO NEW SITE

Among the many unusual methods employed to move buildings, few have been as novel as that used in South Bend, Ind., to transport an old church to a new site where it was to be remodeled into a theater. The structure, after being properly blocked up, was moved over to a railroad track and coupled to a freight engine. Then the locomotive slowly drew the bulky load a distance of five blocks, to a point not far from the new location. Because of unexpected delays nine hours were consumed in making the transfer.

ONE-WHEELED RICKSHA USED ON AFRICAN TRAILS

The one-wheeled ricksha of Africa, like its two-wheeled ancestor, the jinrikisha of Japan, was the invention of a missionary, the designer of the African vehicle being a Swede engaged in mission work on the Congo. An early form of the ricksha is shown in the illustration. Later models of somewhat different construction are made in England and are called "bush cars." The vehicle consists of a framework of bicycle tubing, supporting a cushioned chair seat over a single, low, rubber-tired wheel. The handles in front form a continuous loop, and the rear handles resemble those of a wheelbarrow. Two native boys can easily transport a passenger in the ricksha, and it is the only vehicle practicable for many of the narrow and crooked foot trails which are still the only roads in the greater part of Africa.

Missionary's Wife Seated in a Ricksha for Transportation along Narrow Foot Trails in Angola, Africa

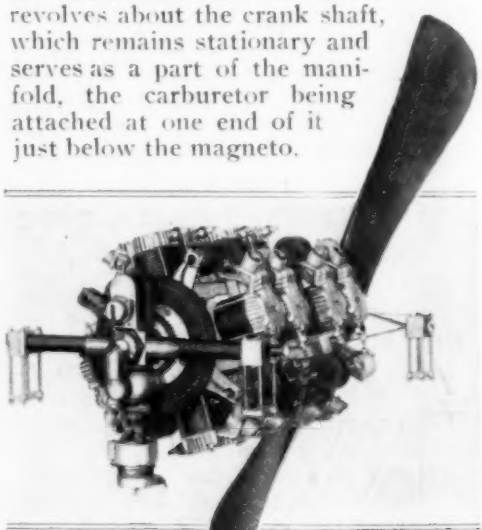
TRUCK SUPERSEDES SLEDS IN ALASKA MAIL SERVICE

The automobile truck has found its way as far north as Alaska. Last November, after the close of navigation, the government employed a machine with a four-wheel drive in place of dog teams, to distribute the mail in the vicinity of Nome. Before the holidays the loads weighed as much as two tons and sometimes a dog sled was used as a trailer. The longest trip made was from Nome to a point 22 miles distant. Instead of following a regular road, the sandy beach was traversed, and in spite of many patches of quicksand and bitter arctic weather, the powerful truck got through to its destination. At the end of the outbound trip the mail was transferred to sleds and carried on to more distant points.

Four-Wheel-Drive Truck Employed in Nome and Vicinity in the Place of Dog Teams to Transport United States Mail. The Dog Sled at the Rear was Used as a Trailer Shortly before the Holiday Season, When the Mail Was Very Heavy

SIXTEEN-CYLINDER ENGINE FOR AMERICAN AEROPLANES

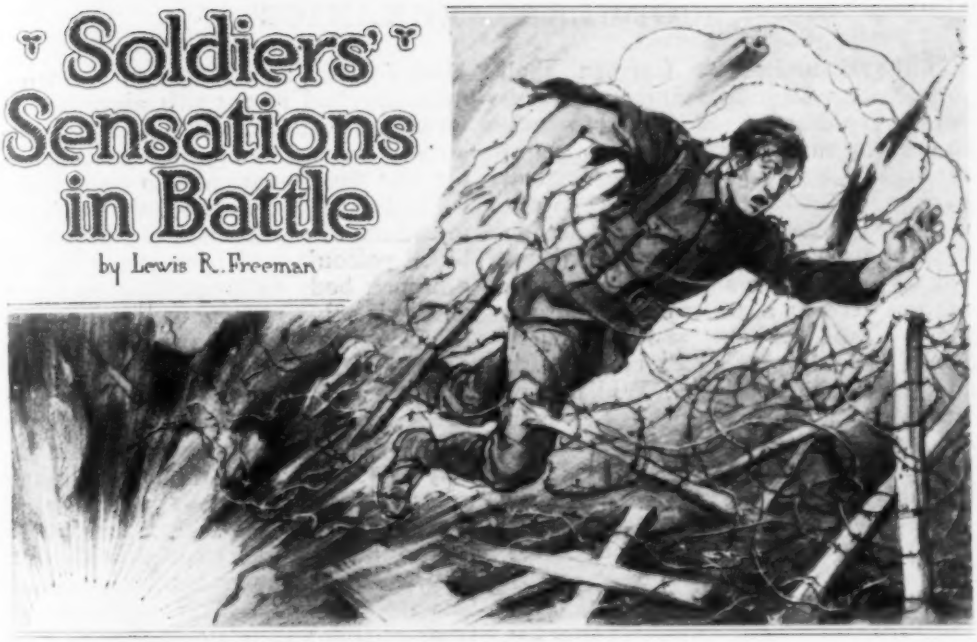
America's gradually increasing concern in aviation matters is beginning to bear fruit, for inventors and manufacturers are concentrating more and more attention upon the development of engines that will free us from dependency upon those of European fabrication. It is therefore interesting to know of a new rotary motor with 16 cylinders that has been developed by a Rochester, N. Y., engineer. Freedom from vibration, obtained by balance and eight light explosions to each revolution; compactness of design, which keeps the head resistance of the unit down to that of a 25-in. circle; simplicity of arrangement, permitting a reduction of the usual number of working parts, and lightness, are among its outstanding features. The motor is rated at 150 hp. and weighs only 325 lb. Instead of using connecting rods, two pistons are built in one piece with a yoke in the center which has a sliding bearing. The intake manifold is cast integral with the crank case. It will be understood that the motor revolves about the crank shaft, which remains stationary and serves as a part of the manifold, the carburetor being attached at one end of it just below the magneto.



This New 16-Cylinder Aeroplane Engine Lately Developed by an Eastern Engineer Has Several Interesting Features. The Gas is Drawn through the End of the Shaft into the Main Manifold and Reaches the Cylinders through Valves in the Piston Heads

"Soldiers'" Sensations in Battle

by Lewis R. Freeman



"A German shell penetrating deep into the soft earth before exploding had driven him, unscathed by the explosion itself, straight through a barbed-wire entanglement. . . . He brought up like a snared partridge in a tangle of the wire, and they had to cut this away before he could be taken out."

IT was recently my privilege to see, in a single period of 36 hours, all the stages through which a wounded soldier of the British army passes from the time he is brought back to the most advanced dressing station on the Somme until he is put aboard the hospital steamer for England or sent to a convalescent depot to recuperate his strength in France. During this short time I saw several thousand wounded men—with injuries all the way from two hours' old to as many weeks—and the one thing that impressed me most (aside, of course, from their magnificent courage and fortitude) was the apparent absence among them of poignant physical suffering. It was the exception rather than the rule to hear a groan; and this was especially true of those whose wounds had received their first careful attention and who (either through rest or sedatives) were over the first shock of injury. In a visit to all parts of a hospital ship about to leave for England with many hundreds of stretcher cases whose wounds had all been received within a day or two, while many—not unnaturally—looked extremely depressed and uncomfortable, I do not recall hearing a single exclamation of agony or even impatience.

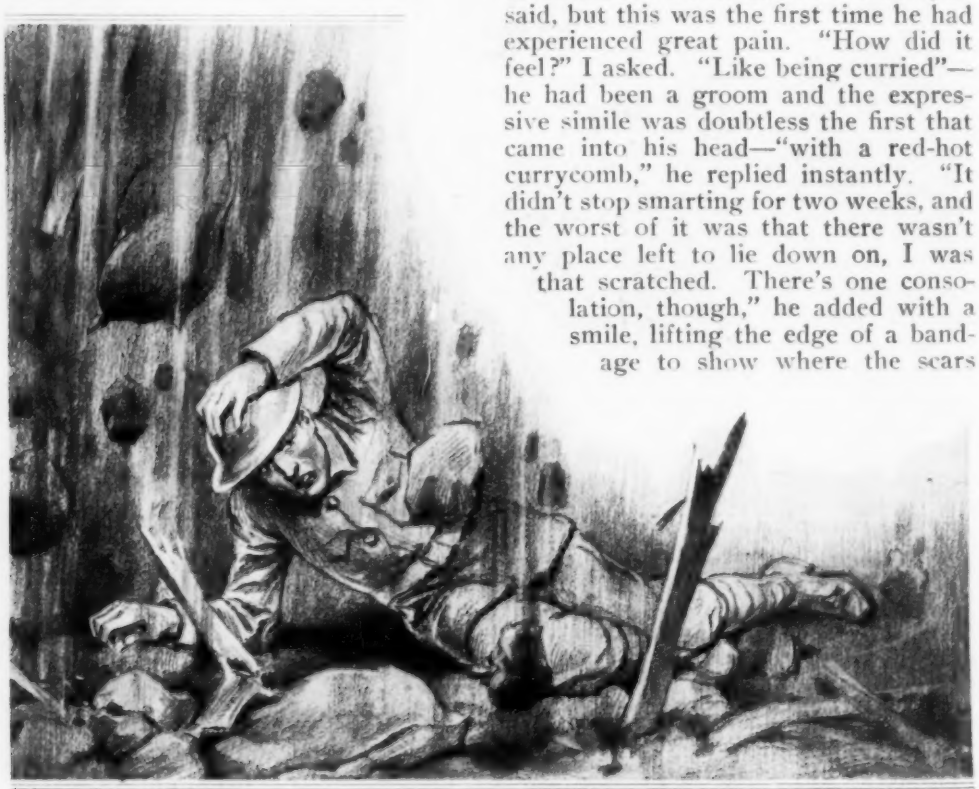
This is all very largely due to the promptitude and skill with which wounds are usually dressed on the western front; but it is also true that the present-day bullet rarely inflicts an extremely painful wound. Indeed, one talks with men dreadfully mangled by shrapnel bullets and shell fragments, who stoutly maintain—though their eyes may be big with horror at the sight of their shattered bodies—that the physical pain is not extreme. I have an especially clear recollection of a young Scotchman, with his lower jaw so shot away that he could not articulate a single coherent word, who still shook his head in vigorous negative when I asked him if the pain was very great. The one class of wounds which are invariably excruciatingly painful are those in the vicinity of the diaphragm, while shots through the lungs or abdomen, though not always imposing great agony, are usually very uncomfortable.

One of the most painfully wounded men I saw was also one of the most

slightly wounded. A German shell penetrating deep into the soft earth before exploding had driven him, unscathed by the explosion itself, straight through a barbed-wire entanglement. Faring better in one respect than the man who jumped into the bramble bush in the nursery rhyme, he did not "scratch out both his eyes." Protected, as they were, by a rather beetling brow, these escaped injury; and they were about the only part of his unfortunate anatomy that did escape. While there was not a cut on him over half-an-inch deep, neither were there more than a few inches of cuticle at any place on his body that had been spared by the cruel barbs. Some of the furrows on his back and legs were over two feet long.

"He brought up like a snared partridge," said one of the doctors who attended him, "in a tangle of the wire, and they had to cut this away before he could be taken out. Although the cuts were not deep, the germ-laden earth of the Somme was so thoroughly rubbed into them that only repeated injections of antitoxin saved him from blood poisoning. I have never known a human body to 'neutralize' so much antitoxin. During the first two weeks he was here he was constantly in greater pain than any one of the many hundreds of far worse wounded men that passed through our hands in that time. He's out of agony and on the way to sure recovery now, but we had a hard fight to save him."

It was nearly a month after he had been injured that I talked with this man, but the memory of the experience was still enough to make his eyes contract with horror when he spoke of it. He had been wounded twice before, he said, but this was the first time he had experienced great pain. "How did it feel?" I asked. "Like being curried"—he had been a groom and the expressive simile was doubtless the first that came into his head—"with a red-hot currycomb," he replied instantly. "It didn't stop smarting for two weeks, and the worst of it was that there wasn't any place left to lie down on, I was that scratched. There's one consolation, though," he added with a smile, lifting the edge of a bandage to show where the scars



"I was about 40 or 50 yards from the mine when it exploded. . . . . The earth rocked; it billowed in waves like the surface of the sea, and I was thrown to the ground. . . . . Then the things that had been thrown up high in the air began to fall, the heavier stuff first, the lighter later and more gently. . . . . I struggled clear of the encompassing mass three or four times before my strength and senses gave way together and I fainted."

were healing in alternate welts of red and white; "if they send me to prison some day, they'll only have to stamp the broad arrow on my back. There won't be any need of a suit of stripes."

As a consequence of the unprecedented artillery bombardments of Verdun and the Somme, and the incessant mining and countermining, the proportion of men buried in earth and rubbish in these areas has been a hundred times greater than in any operations of wars of the past. Those within the direct swath of the explosions are, of course, usually badly mangled or killed instantly. There is, however, a very large number of unwounded, or but slightly wounded, buried by great shell and mine explosions, and it is astonishing how large a proportion of these are rescued little the worse for the experience.

"'Up flew me and the sandbag together, and the first thing I knew was a 'ell of a crack across the 'ips, and there I was 'anging in the blooming tree like last week's wash.'"

This is largely due to the soft porous earth all along the western front, which comes down on a man, as I heard a Tommy who had been through the mill put it, "as light as a feather bed." A heavy shell striking within a few yards of a trench will, unless there is a lot of "chicken wire" or wattle built into the sides, usually cave it in. Bags of earth become hard after a day or two, tending to retain their shape even when upset. If a man is buried under a great many of them life may well be crushed out of him; but if the covering is not too heavy, enough air will usually get in between the bags to prevent his suffocation. I talked with one man who said that his worst discomfort during the ten hours he was buried under six feet of sandbags was from fleabites which, because his arms were pinioned, he could not scratch. Another, who was buried and stunned under a heavy layer of bags, was located and rescued the sooner through the whining of the company's pet dog that was covered up near him.

Mining and countermining have been responsible for some remarkable exploits and sensations. One of the most thrilling recitals I ever listened to was that of a sapper who was in command of a party trying to countermine a tardily discovered tunnel which the Germans had driven up almost under a very important British position on the Somme. "Before we located the tunnel," he said, "the Germans had driven it very nearly to a point at which the explosion of a large mine might have had very serious consequences for us. Our game, therefore, was to frighten them away, or, failing that, at least to hustle them so that they would place and fire their mine as far away as possible from the point at which they aimed. Accordingly, in driving our countercut, we made as much noise as we could in digging in order to give them the impression that we were much nearer them than we really were. This did not stop them, and, as they appeared determined to push on to their original objective, the only thing left for us

to do was to drive as near them as we dared and rush up the explosive for a small mine in the hope of caving in their tunnel by the shock, or, if luck were with us, even of setting off any explosive they might be getting in place.

"The ticklish part was in deciding how long to hang on, how long to wait before starting our little diversion. If we fired too soon we might be so far away from them that their cut wouldn't be affected, and then all our work would be lost and there would be left no means of checkmating them. If we waited too long they might push to a point so near that their end would be accomplished. Not a dirt-grimed mole among us—nor probably among the Germans either—but, consciously or unconsciously, was trying to pierce that earthen barrier with his mind as well as his tools and know the mind of the men on the other side. Perhaps it was because German psychology—here as in diplomacy—was faulty; perhaps it was only sheer luck. At any rate—I can't describe the sensation, but it was just as though something suddenly seemed to say to me, 'Now's the time!'—I fired such stuff as I had on hand first, and at what was probably about the right moment. The 'heading' of the German tunnel was even nearer us than I had anticipated and—although I was never sure that we detonated any of their explosive—their cut was so shattered and shaken that they did not attempt to use it again."

An officer of a London regiment who was introduced to me as "a man who had carried out to the letter the work he had been sent on, after having been buried for over an hour by the explosion of a German mine," in trying to explain to me "what it felt like," led me to a little eminence from which, standing on the ruins of a village church, we had an unobstructed view of a sector of the German trenches, a half mile away, that was under a concentrated bombardment of the British "heavies" in preparation for an imminent attack. "You see the way the earth flies up with a rush and falls almost gently back," he said, pointing to the geyser of dust and débris and smoke that followed the explosion of a 15-in. shell. "Well, that is a mine on a small scale. Anything or anybody right over it is torn to pieces; and serious injury is usually inflicted upon anyone struck by the more solid of the falling fragments. But—in this region at least—most of the stuff that goes up and comes down is soft earth, and the chances of a man's getting out of that (if only he isn't buried too deep) are ten to one in his favor.

"It would hardly be proper for me to tell just why I happened to be where I was at the time. Suffice to say that I was about 40 or 50 yards from the mine in question when it exploded. Even at that distance the earth rocked—indeed it more than rocked; it billowed in waves like the surface of the sea—from the force of the explosion, and I was thrown to the ground by the sudden shock. A fragment of heavy timber flew by me. Some heavy lumps of earth struck me, but nothing more solid. These were driven straight out by the force of the explosion. Then the things that had been shot up high in the air began to fall; the heavier stuff first, with solid impact, the lighter later and more gently. Stones, fragments of timber, and bits of other trench materials arched over in even trajectory like the water of a fountain jet. After them came the clods and other stuff of medium weight. Then, out of the mushrooming cloud of smoke and dust which was swirling and spreading two or three hundred feet above, the lighter stuff—the finely disseminated earth, and leaves and pieces of bark—began to settle down.

"By great good luck, none of the heavy stuff struck me; and yet, for half a minute or more, the rain of clods was so heavy as practically to stun me. Although these fell to a depth of six or eight feet, I have always felt that, if I had not been more or less dazed by the shock, I could have fought my way upward fast enough to keep my head 'above water' all the time. Even as it was, I struggled clear of the en-

compassing mass three or four times before my strength and senses gave way together and I fainted. My last clear recollection was of having struggled free of the heaviest of the clods, and of the rather pleasant sensation—almost like the touch of falling snow—occasioned by the gently settling dust. It was probably this latter stuff—by cutting down my supply of oxygen—that caused me to faint. Fortunately, I had had the presence of mind to pull a corner of my tunic up across my face, so that, as there was plenty of air all through the fallen dirt, I would probably not have suffocated even if I had been covered up for several hours. As it was, I was so little upset in mind and body after being pulled out that, after a spell of coughing, a drink of water and a few minutes' rest, I was still able to go ahead with what I had been sent to do."

One cannot talk long with a Tommy on the Somme without hearing some weird tale or another of what he has seen happen to one of his comrades as a result of shell explosions in the trenches. For obvious reasons these tales are almost invariably told about some one else; in fact, the one first-hand recital of such an incident that I heard was a far less illuminative account of what happened than might well have been told by one of the chief actor's comrades. I talked with the man in a hospital where he had been for a month recovering from crushed pelvic bones and internal injuries caused by impact with the limb, 20 ft. from the ground, of a tree against which he had been thrown by a German shell exploding in his trench.

"I was sitting on a sandbag," he said, "when the blighter that done the business plumped right into the bottom of the trench and buried itself deep in the mud before exploding. Up flew me and sandbag together, and the first thing I knew was a 'ell of a crack across the 'ips, and there I was 'anging in the blooming tree like last week's wash. Didn't 'ave to 'ang on at all. It just plastered me round the lim' like a piece of soft meat. I couldn't climb down, and, as they 'ad no ladders, there was nothing to do but for one of the boys to shin up and let the remains of me down at the end of a line. Course it 'urt like 'ell, getting me down; but I'm sure I didn't go off in a faint at that stage of the show, cause I can remember cursing, with the little breath I 'ad left, some bloke 'oo 'ad mooched along and was tryin' to snap me with a bit of a camr'y 'e'd smuggled up to the trenches. Camrys in the trenches are strictly forbid, and you can jolly well believe I told 'im wot I thought of 'im for 'aving it."

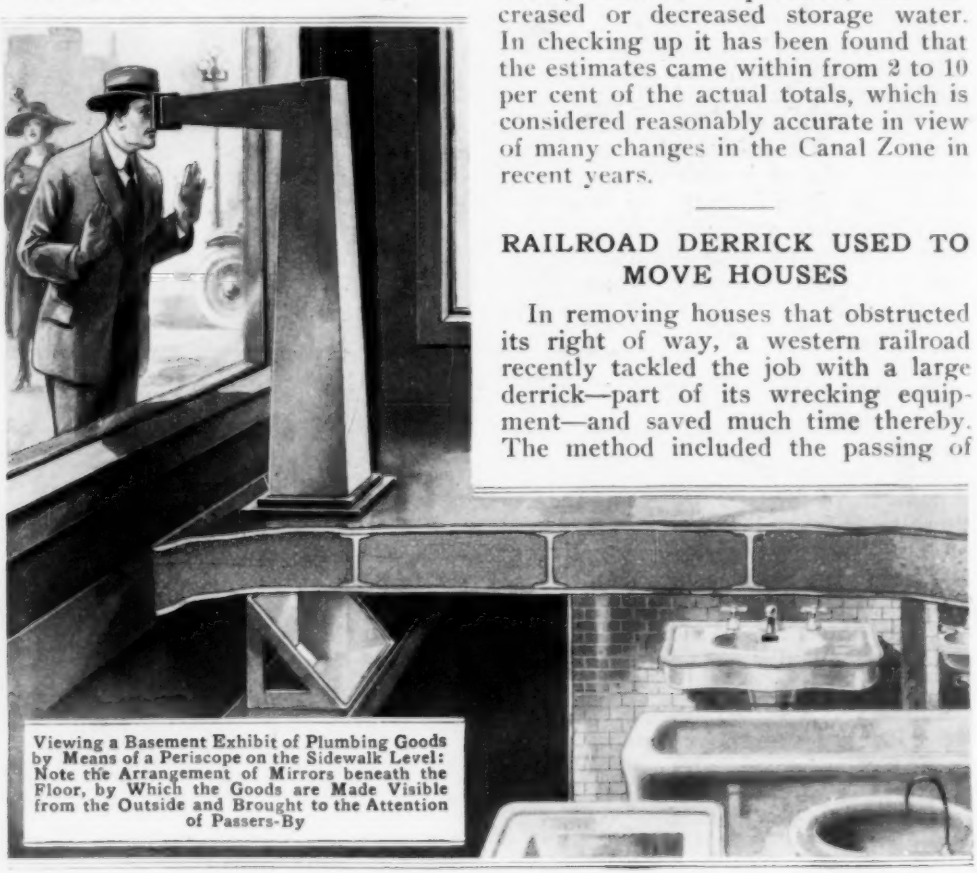
MANY APPLICANTS FAIL IN CLIMBING TEST

Some indication of the physical endowments of the average young man in this country may be found in the results of a test recently given to applicants seeking positions in the fire department of Portland, Ore. Each man was asked to climb five rungs of a ladder in hand-over-hand fashion. Of the 150 who made the attempt 74 were able to climb the required number, while only 10 exceeded the minimum. The results of the trials are especially interesting in view of the prevalent discussion of the need of more systematic physical training for the young.

An Applicant for a Position in the Portland, Oregon, Fire Department Undergoing a Climbing-by-Hand Test

PERISCOPE REVEALS GOODS IN STORE BASEMENT

By the novel use of a periscope installed in a show window on Michigan Avenue, Chicago, an exhibit of goods in the basement, which would otherwise be completely out of sight, is revealed to the gaze of interested passers-by. The idea originated in the establishment itself, and so far as is known, this is the first case of commercial use of the instrument in this way. The eyepiece is fixed close to the window pane, at a convenient height to be used by persons on the sidewalk outside, and a small sign says, "Look! See the Exhibit in the Basement." On peering into the eyepiece, one can plainly see the goods displayed on the floor below, the shaft of the periscope passing through the floor of the show window, below which an arrangement of mirrors set at the proper angle brings the display of basement goods into view.



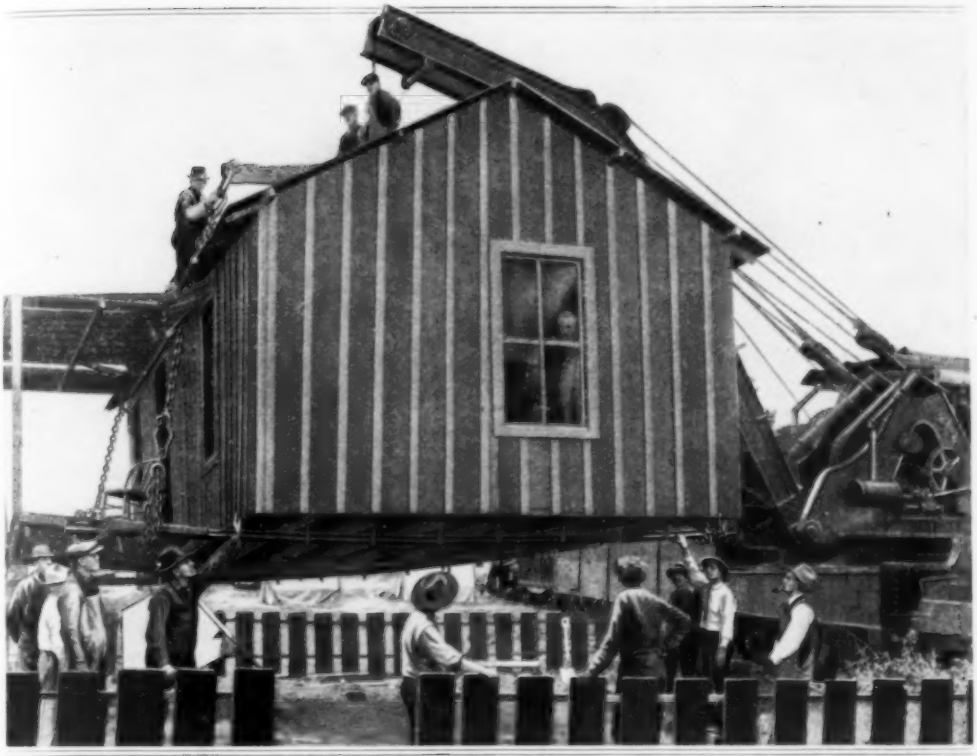
Viewing a Basement Exhibit of Plumbing Goods by Means of a Periscope on the Sidewalk Level: Note the Arrangement of Mirrors beneath the Floor, by Which the Goods are Made Visible from the Outside and Brought to the Attention of Passers-By

WATER SUPPLY OF CANAL ZONE CLOSELY COMPUTED

It is interesting to note that the estimates that were made by French and American meteorologists before the Panama Canal was built regarding the available water supply in that region were substantially correct, as is shown by the careful check which has been kept since the canal has been in operation. Rainfall and evaporation stations have been established over the Gatun Lake watershed, which comprises a large area, and an account is kept of the gain or loss of water due to lockages, spillway waste, hydroelectric-power generation, leakage, municipal needs, rainfall, evaporation, and increased or decreased storage water. In checking up it has been found that the estimates came within from 2 to 10 per cent of the actual totals, which is considered reasonably accurate in view of many changes in the Canal Zone in recent years.

RAILROAD DERRICK USED TO MOVE HOUSES

In removing houses that obstructed its right of way, a western railroad recently tackled the job with a large derrick—part of its wrecking equipment—and saved much time thereby. The method included the passing of



Moving a House with a Railroad Derrick: The Building was Supported on Steel Rails, Attached by Chains to the Arms of the Derrick. The Man at the Window and Other Residents were Undisturbed

four chains around the house to be moved, connecting them to steel rails on either side beneath the building, on which the weight rested, and then lifting the whole bodily into the air by means of the derrick to a new position beside the right of way. The houses being situated close to the track made the use of the derrick feasible, and the removal was accomplished without disturbing the residents or damaging the buildings, except where the roofs overhung.

SHELL AND GAME BAG FOR SPORTSMEN

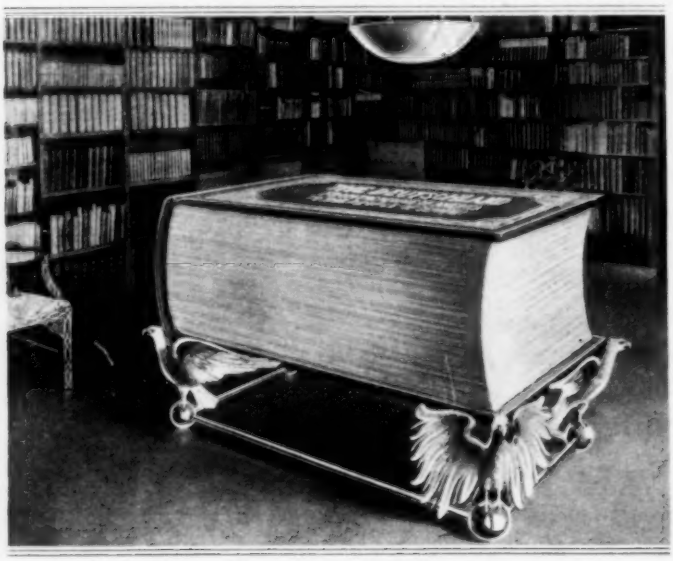
Both hunters and fishermen may be served by a combined shell and game bag recently placed on the market in California. This bag is provided with means for circulation of air over fish or game carried inside, has four pockets for shells or tackle, and is so hung and adjusted that the contents of the pockets can be readily reached and the weight is distributed evenly. It is

Front and Side Views of Combined Shell and Game Bag Adapted to Carry Fish and Tackle

made of standard khaki duck and may be worn either with or without a coat. It hangs from the shoulders by broad straps, and buckles in front.

HUGE VOLUME TO CONTAIN "DEUTSCHLAND" STORIES

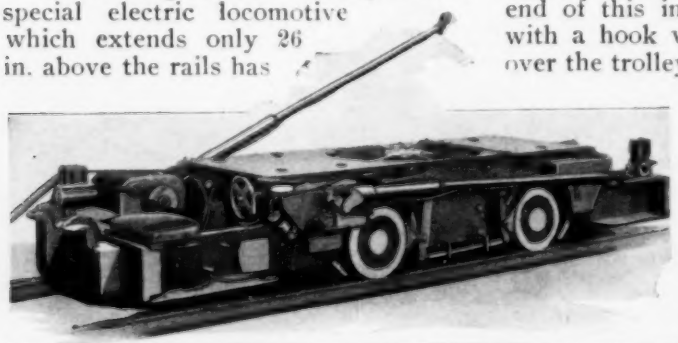
In commemoration of the historic first voyage of the merchant submarine "Deutschland" to America, a committee, organized in this country, is preparing a huge book which will contain every available reference to the submarine's trip which has appeared in American publications. The tome when finished will measure 6 ft. long and 2 ft. thick and will be presented to the Royal Library in Berlin. The names of those contributing in any way to this memorial will be engrossed on the pages of the book. The unique volume will be bound in solid silver, embellished with corners and clasps of wrought gold. It will rest on four gold eagles, two typifying Germany and two emblematic of the United States. This is the first instance on record, it is claimed, in which practically all that has been printed in a whole country concerning a historic achievement is to be gathered into one book.



First Design of Mammoth Scrapbook, Handsomely Bound, Which is to Contain All Available Clippings from American Publications Regarding the First Voyage of the "Deutschland." It will be Presented to the Royal Library in Berlin

SQUATTY MINE LOCOMOTIVE WORKS IN LOW DRIFTS

To meet conditions in a certain coal mine whose galleries are very low, a special electric locomotive which extends only 26 in. above the rails has been built. It is fitted with two trolley poles, one on each side, and a 300-ft. reel of cable that is employed in passages too low to permit overhead conductors to be strung safely. The free end of this insulated line is supplied with a hook which the operator slips over the trolley wire in one of the main levels when he is about to enter a small side drift. As the locomotive proceeds the reel unwinds. When the direction is reversed and the distance retraced, the reel winds automatically, recoiling the cable rapidly so that it does not slacken enough to cause interference.

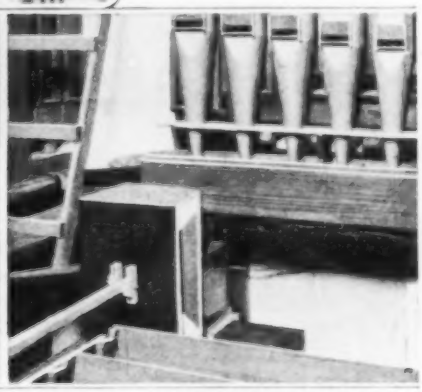


This Locomotive Weighs Two and a Half Tons, Is 26 Inches High, and Pulls a 50-Ton Load Easily. It was Built Especially for Use in a Coal Mine Whose Galleries Are Exceptionally Low

PIPE ORGAN IN A STORE SERVES TWO FLOORS

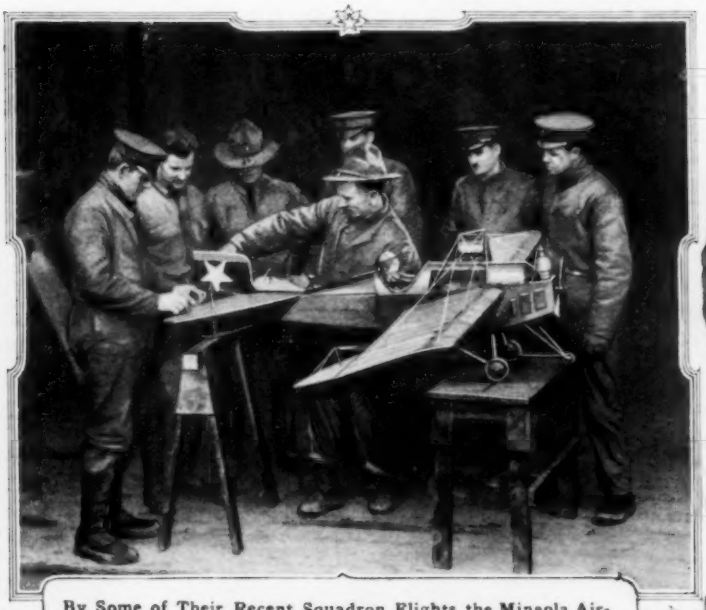
Some novel features of pipe-organ construction and service are embodied in a $10,000 instrument recently installed in a progressive department store in Los Angeles. The organ and its keyboard are placed in a large auditorium on the fifth floor, open to customers for rest and entertainment. Directly below, on the fourth floor, is the café of the store, to which the music of the organ is conveyed by means of a "musical radiator," 20 ft. long and 12 ft. wide, built of ornamental wood in the ceiling of the café and communicating directly with the pipe room above. This radiator is provided with heavy wooden shutters padded with felt, which serve to exclude the music at will. They are controlled from the organ keyboard, or from the café by means of a small stop which is operated by air pressure. The keyboard is said to be equipped with 20 more stops than have ever been built into any other organ. Motive power for the pumps is supplied by electricity, or by a water-power motor if required. As the organ serves two floors, its cost is expected to be soon covered by the elimination of the café orchestra. It was built and installed by California mechanics.

Above Is the Auditorium of a Los Angeles Department Store, Showing at the Left the Keyboard of a $10,000 Pipe Organ the Music of Which is Conveyed to the Café Below, by Means of the "Musical Radiator" Seen in the Ceiling in the Lower Picture



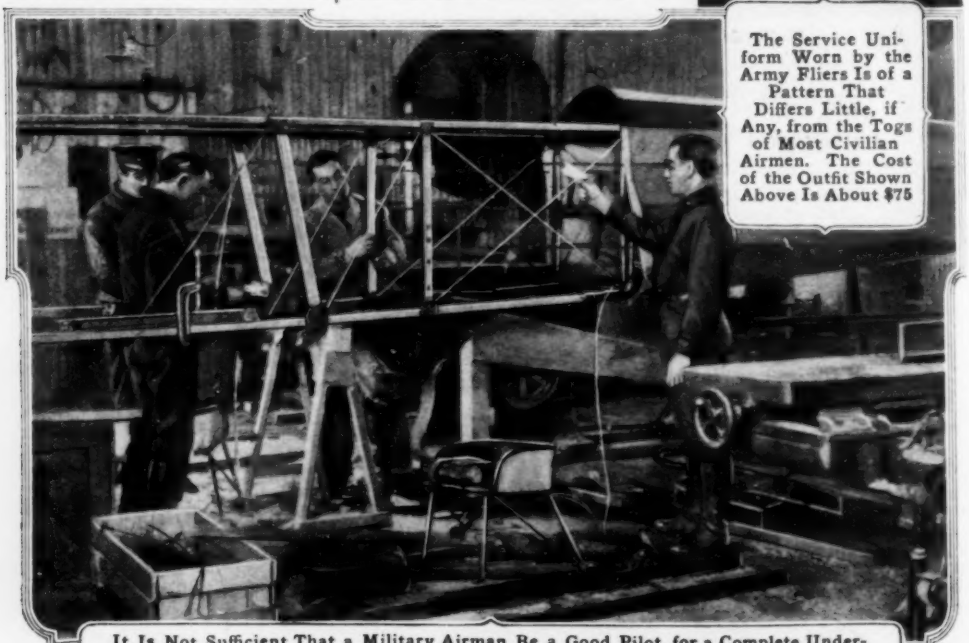
Pipe Room of the Organ, Situated on the Auditorium Floor of the Store: The Bellows are Seen Just below the Pipe Ends in the Picture at the Right, Also a Glimpse of the Shutters of the "Musical Radiator"

PREPARING AERIAL FIGHTERS AT MINEOLA



By Some of Their Recent Squadron Flights the Mineola Airmen, Who Are Students and Instructors at the New Aviation Station Established at Mineola, New York, have Come into Notice. The Work That is being Carried On at This Field Is Such as to Encourage the Advocates of Aerial Preparedness. The Picture Presented Above Shows a Group Studying the Details of a Model Monoplane Constructed by One of the Privates

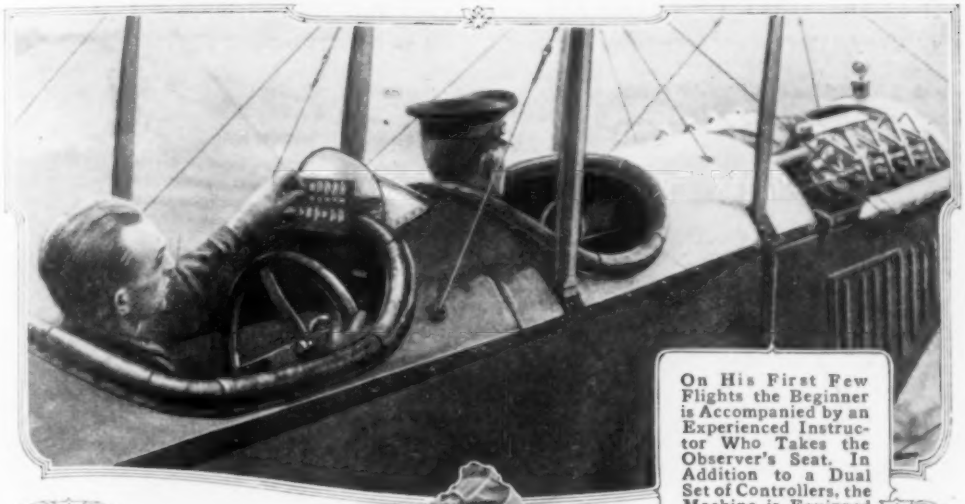
The Service Uniform Worn by the Army Fliers Is of a Pattern That Differs Little, if Any, from the Togs of Most Civilian Airmen. The Cost of the Outfit Shown Above Is About $75



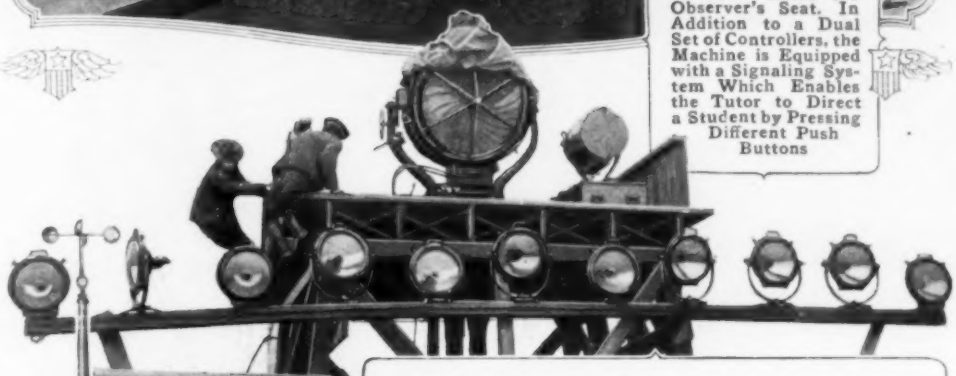
It Is Not Sufficient That a Military Airman Be a Good Pilot, for a Complete Understanding of the Craft and the Knowledge of How to Set Up as Well as Repair It When Breaks Occur Are Imperative. Therefore the Student Fliers are Taught How to Assemble a Machine and Construct Minor Parts Which Might Sometime Require Renewal. This Picture Shows Them Hard at It in a Workshop at Mineola

PHOTOS COPYRIGHT AMERICAN PRESS ASSN.

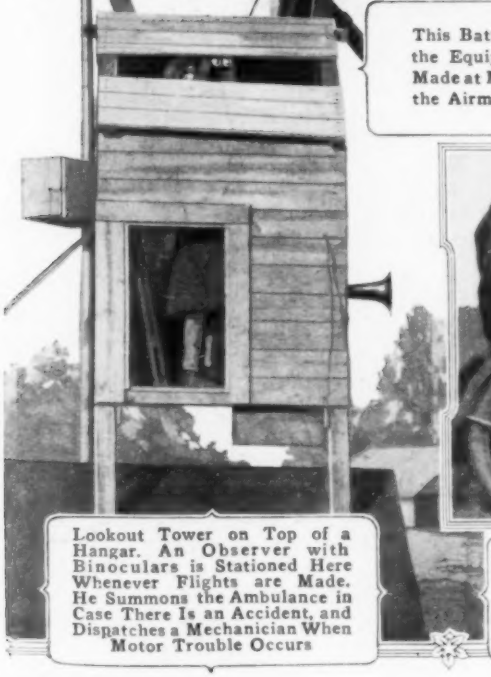
FOR ARMY'S EMBRYONIC AVIATION SECTION



On His First Few Flights the Beginner is Accompanied by an Experienced Instructor Who Takes the Observer's Seat. In Addition to a Dual Set of Controllers, the Machine is Equipped with a Signaling System Which Enables the Tutor to Direct a Student by Pressing Different Push Buttons



This Battery of Searchlights Is an Important Part of the Equipment at Mineola. When Flights are being Made at Night the Small Flood Lights are Used to Guide the Airmen and Help Them in Making Safe Landings



Lookout Tower on Top of a Hangar. An Observer with Binoculars is Stationed Here Whenever Flights are Made. He Summons the Ambulance in Case There Is an Accident, and Dispatches a Mechanician When Motor Trouble Occurs

Motorcycles with Sidecars Attached are Used for Carrying Mechanicians Quickly to Different Parts of the Field When an Aeroplane Comes Down on Account of Mechanical Trouble. Machines Like This have been Used on the Mexican Border for Similar Purposes

PHOTOS COPYRIGHT AMERICAN PRESS ASSN.

SPECIAL BOX CAR CARRIES AUTOS IN TIERS

In a new freight car special provisions have been made, enabling four ordinary autos to be loaded at once, or

In This New Freight Car for Autos the Windlasses Seen at the Right and Left are Used to Hoist the Upper Auto onto Its Platform of Channel Irons

five if they are not over 13 ft. long. The length of the car is 40 ft., height 10 ft., and width 9 ft. At each end there is a windlass-and-chain arrangement by which one automobile can be raised on a platform of channel irons and securely fastened in place so that another can be loaded beneath it. Thus two autos can be placed at each end, one over the other, by means of the special hoisting, locking, and safety devices, while a fifth can be put in the center of the car, if desired, and braced by the old method, namely by wood and nails. It is claimed that a great deal of time can be saved in loading and unloading motor cars by the use of the special box car, and that there is also a saving of freight.

¶Steps are being taken to establish a plant in Columbia, S. C., which will manufacture starch from sweet potatoes.

GERMANS OBTAIN OIL FROM FRUIT STONES

An organization of German women has undertaken the collection of plum and cherry stones, according to a report, from which it is proposed to extract oil by a new process. This work is undertaken in an effort to overcome the shortage of oil in Germany. The cracked stones are treated with a solution of calcium chloride of such specific gravity that the shells fall to the bottom, while the kernels rise to the surface. These are skimmed off, washed and dried, and the oil is pressed from them. Oil prepared from plum stones in this way is described as having the odor and taste of bitter almonds. However, by treating it with steam or by heating it the odor can be largely removed. Exposure to the air for several days will effect the same change.

BUILDING BURNS DOWN BUT FIREPLACE IS UNHARMED

It is not altogether uncommon to find a chimney standing after the structure built around it has been burned, but an unusual feature was added to such an occurrence in Waco, Tex., recently, in that a handsome fireplace as well as its chimney passed through a destructive conflagration practically unharmed. The structure destroyed was a fine clubhouse, and the fireplace, which was the gift of one of the members, was built of white limestone. Although the building was burned to the ground, the smoke flue, together with the handsomely embellished hearth, remained uninjured.

Meals for Several Hundred Soldiers are Prepared at One Time in This Kitchen Car, Which is Carried with Troop Trains Operated on One of the Canadian Railways

LARGE KITCHEN CARS BUILT FOR TROOP TRAINS

Kitchen cars that are individually of sufficient capacity to meet the needs of a fair-sized hotel are being carried with the long troop trains operated on one of the Canadian railways between military training camps and the seaboard. They have been constructed to facilitate the dining service so that meals can be prepared for several hundred men and served without confusion or delay. Each of these mobile kitchens occupies an entire car, is equipped with a 10-ft. range, steam-cooking apparatus, a spacious refrigerator, and other necessary paraphernalia. This is all installed on one side and inclosed by a long table extending the full length of the car. A passageway is provided between this counter and the unobstructed wall, so that waiters can enter and leave the kitchen without disorganizing the work of the eight cooks and helpers. A noncommissioned officer orders certain of the soldiers in each car to act as waiters. At the appointed time a group of the latter from the first and the last cars walk to the kitchen, which is carried in the middle of the train, and get the big trays of food arranged for them on the serving counter. As soon as they have returned to their comrades, squads of waiters from the next two cars repeat the routine. In this way all of the soldiers are attended to within a short time and without difficulty.

CATCHING TURTLES WITH A HOOKED STEEL ROD

Turtle catching is an invigorating occupation now followed with profit by hunters in various parts of the country, who ship their quarry to city restaurants where the creatures are made into savory soup. Turtles are particularly easy to catch in the late fall and winter when they are hibernating in the mud of a pool or near the bank of a stream. It is a common practice for

hunters to pitch camp in a well-stocked region and then systematically search along the shores of every body of water within a radius of eight or ten miles.

Expert Turtle Catcher Photographed Just After He had Captured Several Creatures with His Hooked Spear

On such expeditions a man often carries a hooked steel rod with which the sleeping creatures are jabbed and drawn from the water. The aggregate weight of turtles caught in a single hole will sometimes be as high as 500 pounds.

NEW SUGAR PROCESS MAY INCREASE PRODUCTION

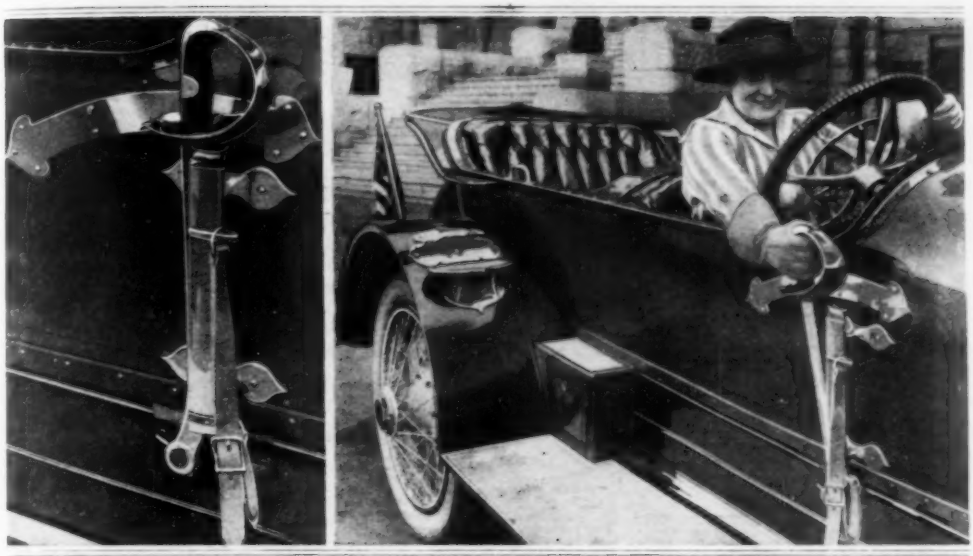
A gain of at least three and one-half per cent, it is predicted, can be made in the commercial sugar crop of the Hawaiian Islands, and other regions as well, because of a new process, discovered by a resident of Hawaii, which recovers sugar from the so-called "final molasses." The new method takes from the final molasses nearly one-half of the eight per cent of sugar that heretofore has been considered a total loss. The inventor declares that his process will involve practically no additional cost in production, and that the cost of additional machinery needed is not large. In his experiments he has worked on the theory that it is not the glucose gums or ash, but solely the water in the molasses, that has prevented the sucrose therein from crystallizing. After removing practically all the water by boiling, a centrifugal of very high speed is used.

COSTLY TELEPHONE STANDS IN SUMMER HOME

Ornamental standards, gold-finished and said to cost $200 apiece, are among the special features of the telephone system recently installed in the summer home of a Chicago manufacturer at Ipswich, Mass. The system is of the automatic type, making intercommunication easy between any of the rooms of the large house and also with the indoor and outdoor departments of service, the casino, tennis court, Italian and rose gardens, swimming pool, farmhouse, dairy, and power plant. A directory card is conveniently mounted on each of the telephone standards. The European type of hand receiver-

Telephone Stand in a Millionaire's Summer Home. It is Gold-Finished and Has the European Style of Instrument

transmitter is used, this combined instrument hanging from a contact-lever hook on the heavily gilt standard.



A Distinctive Automobile Having, Instead of Doors, Nickeled Steps by Which One Mounts over the Side. A German Saber Serves as an Emergency-Brake Handle. A Launch Whistle Gives Warning Signals, and a Yacht Flag, Held Slantingly, Adorns the Rear

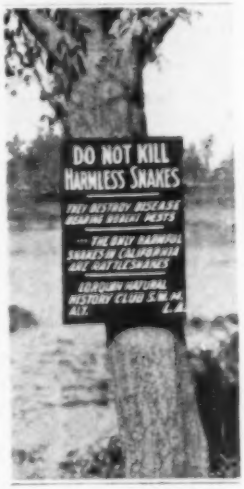
AUTO HAS MILITARY AND MARINE ADORNMENTS

The fact that a German saber has been used for an emergency-brake handle is perhaps the first of several novel features to be noted about the body of the car shown herewith. The end of the saber has been cut off and the weapon welded to the brake lever, while a slit has been made in the side of the scabbard so that it serves as a sheath. The car has no doors and access to it is gained by steps of nickeled brass, inlaid with rubber treads. A nickeled angle iron forms a finished edge around the top of the body. On the front is a launch whistle operated by air from the air-starter tank, while at the rear a flag is held in place by a yacht flag socket. The windshield, not shown, has a frame of double sheets of brass, nickeled on the front and dull green on the reverse.

¶The president has forbidden the sale or transfer of any American-registered vessel to a foreign registry or flag, without consent of the new shipping board. Over 100 vessels were sold to foreign registry in the seven months preceding this order.

CAMPAIGN AGAINST KILLING OF HARMLESS SNAKES

A natural-history society of southern California is trying to prevent the killing of harmless snakes, and is conducting a campaign of education to inform the public that the only harmful and dangerous snake in that state is the rattlesnake. All other snakes in California are classed as public benefactors, because they destroy the rodent pests that convey diseases and damage crops. The doctrines of the society are being spread broadcast by means of placards and signs along the highways, trout streams, and mountain trails, and in the forests of the state, also through the press, the public schools, and the Boy Scouts.



VAST AUDIENCE SHOWN FILM ON FOUR SCREENS SIMULTANEOUSLY

FOUR separate exhibitions of a popular photoplay were given simultaneously in Convention Hall at Kansas City recently before some of the largest moving-picture audiences on record. The entertainment was a free one given for advertising purposes by a local newspaper. There were five performances and at each of them nearly 14,000 persons crowded the auditorium. Four screens were arranged in the form of a square and suspended in the middle of the big room, while projectors were installed opposite each. This made it possible for practically every spectator to see the screen. By means of a signaling system, the films were run almost in synchronism.

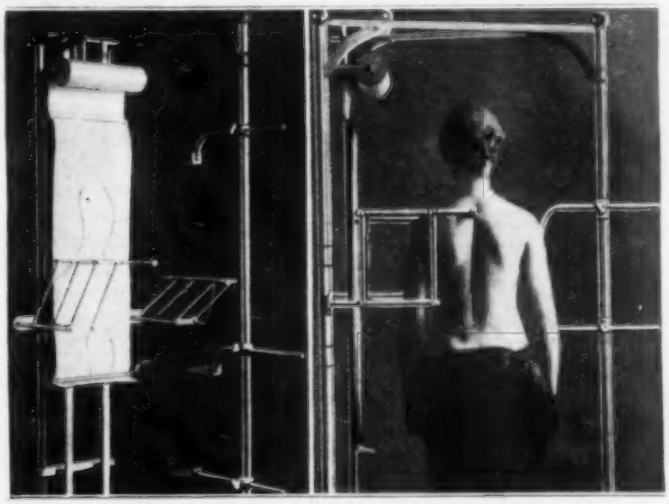
LIFE BELT EQUIPPED WITH FLASH LIGHTS

In the darkness of a storm at sea, many a shipwrecked person, clinging to a life preserver, has finally despaired and gone down for lack of means by which he or she could signal to rescuers. This fact has recently prompted the invention of a luminous life belt, by a resident of New York City. It is made in either circular or folding form, and firmly strapped to it are two electric flash lights, thoroughly insulated against contact with the water and operated by a conveniently located button. The two lights are placed some distance apart so that if one is submerged the other probably will project above the water. The flashing signal of such a life belt would many times attract attention when a person clinging to an ordinary preserver would be undiscovered in the darkness.

Life Belt Equipped with Flash Lights with Which the Wearer could Signal in the Dark to Rescuers and so Indicate His Whereabouts

CONTOUR OF GIRL STUDENTS RECORDED BY MACHINE

In sizing up the girl students for physical-culture work at Wellesley College, accurate outlines of the chest and back are obtained and measured by means of an apparatus called a thoracimeter, specially designed for the college gymnasium. It comprises a platform and a standard supporting two outlining and recording arms and a wide strip of paper mounted on rollers. The student stands on the platform between the metal arms, the outer ends of which are then passed down the middle lines of the back and chest, respectively, from neck to waist. The outlines traversed are recorded automatically upon the paper strip by crayons at the inner ends of the arms. Thus when the student steps off the platform she sees before her a graphic outline of her body above the waist. From this the instructors decide what exercises the girl needs to develop the lines of health and beauty, and subsequent outlines show the development from time to time.



Recording the Outlines of the Chest and Back by Means of the Thoracimeter, as Used at Wellesley College: Details of the Apparatus at the Left

DEN OF SNAKES DISCOVERED BY MOTORCYCLISTS

Two students of the University of Arizona, who were making a motor-

Two Arizona Motorcyclists Almost Stepped into This Den of Large Snakes When They Stopped to Shoot at a Rabbit near the Road

cycle trip to Phoenix recently, stopped by the wayside to shoot at a rabbit and found themselves close to a den of snakes of surprising size and number. They had the presence of mind—and the nerve—to make a snapshot of the extraordinary scene, showing the tangled family of snakes arousing at their approach. When the young men returned to relate their exciting experience, the photograph told its own story.

ELECTRIC LOGS FOR FIREPLACES

Electrical fire logs are now being manufactured in various styles for houses and apartments which are similar to those which have been in use for stage purposes for several years. A translucent material and asbestos, reinforced with metal, are used in their construction. The bark and ends are fashioned and hand-painted to resemble natural wood. Inside the logs, which are hollow, are placed electric lights that give the fixtures the appearance of burning.

LONG-LIVED DRY CELLS OF NEW TYPE

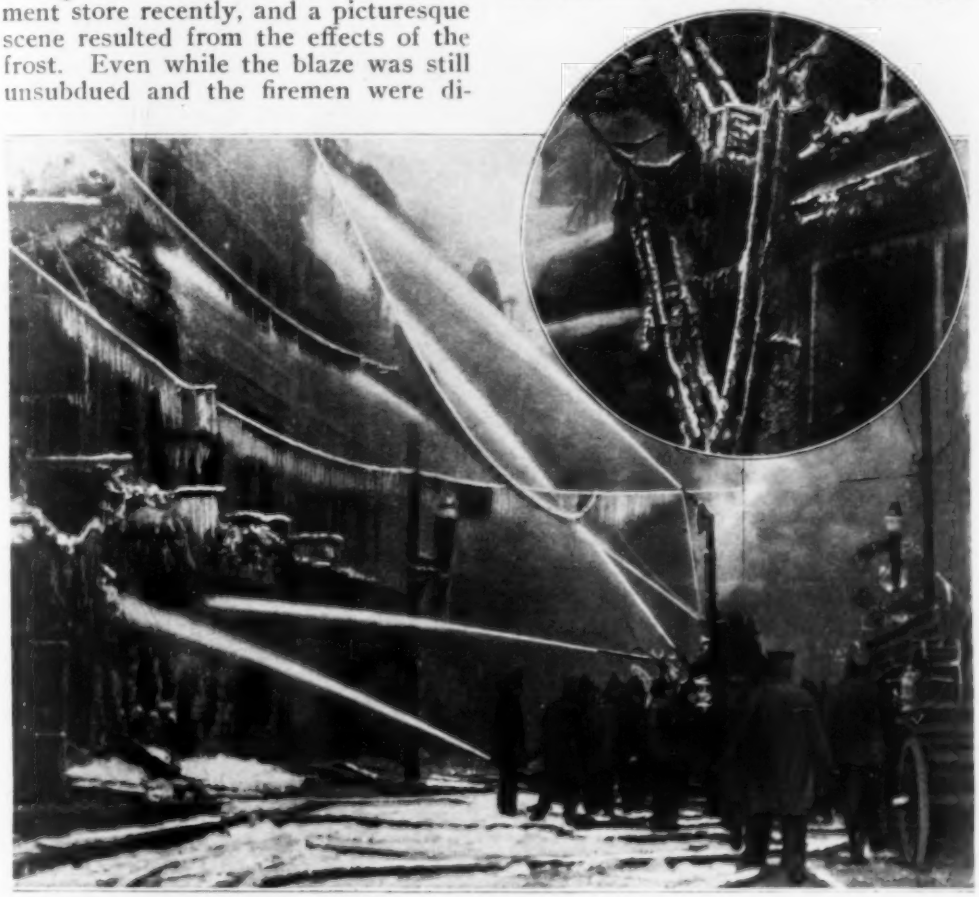
A patent has been granted to two Orange, N. J., inventors recently, pertaining to a type of dry cell intended to overcome the defects of an ordinary cell due to the drying out of the electrolyte and the deterioration of the electrode even when on open circuit. In this new cell a gelatinous electrolyte of caustic soda and starch is used, and by this ingenious combination the ordinary cause of trouble has been largely eliminated, it is claimed. When zinc and oxide-of-copper electrodes, for example, are employed it is said that the efficiency of the cell is greatly increased, being even greater than a wet battery employing similar electrodes and an alkaline electrolyte.

RUBBER SHEATHS SAFEGUARD ELECTRICIANS' WATCHES

Rubber cases are being made to protect the watches of electrical workers and others from being injured when carried into highly charged electromagnetic fields. Such a covering envelops all but the face of a watch and thoroughly insulates its metal parts. When applied it also lessens the chance of an instrument slipping from a workman's pocket. A protector of similar character is provided for those who desire to safeguard their timepieces from dust and water. This type of covering does not extend over the stem and ring, as does the other, but seals the seams.

PICTURESQUE FIRE RUINS OF DEPARTMENT STORE

Intense cold prevailed during a fire that gutted a large Pittsburgh department store recently, and a picturesque scene resulted from the effects of the frost. Even while the blaze was still unsubdued and the firemen were directing many streams of water into the doomed building with all their latest apparatus, the store fronts on Fifth Avenue and Smithfield Street assumed the appearance of icy grottoes, each ruined story being heavily outlined in ice, with fringes of icicles pendent from every overhanging ledge. Adjacent trolley wires too were thickly coated with ice, and bore glistening fringes of a natural beauty that stood out in marked contrast to the smoky huddle of destruction behind the walls.



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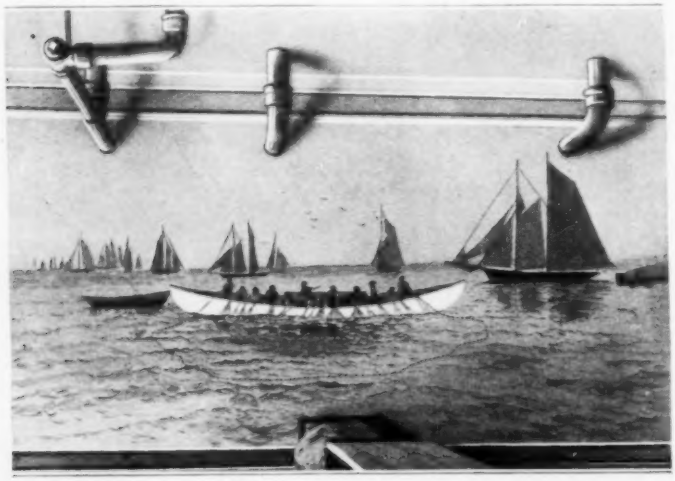
Scene on Fifth Avenue, Pittsburgh, during a Recent Department-Store Fire: Note the Curious Effects of Water and Frost on the Trolley Wires in the Foreground. The Smaller Picture Shows Part of the Ruins on the Smithfield Street Front

HIVES OF BEES IN BANK WINDOW TEACH THRIFT

Two beehives, each containing several thousand bees, were the principal feature of an attractive display intended to teach thrift, which was installed in a window of a large Chicago bank not long ago. A painted farm scene furnished the setting for the hives, and in the foreground were grass matting, earth, and bark, which gave the display a realistic touch. Savings banks were strewn in the path that led from the hives to the painted fields. At intervals there were signposts bearing legends telling of the value of the habit of saving.

REMARKABLE PAINTINGS IN A FISH STALL

Artistic genius sometimes crops out in strange places. The walls of a seaside fish stall are almost the last place where one would expect to find mural paintings of artistic merit; but two pictures that deserve this description may be seen in a fish stall on a wharf in South Boston, where they were painted by one of the fish handlers as decorations to cover up the bare walls. It is said the man never took an art lesson, and artists have declared his work wonderful. One of the paintings represents a seining scene on the Banks, with the crew of a large dory hauling the seine in the foreground and a fleet of fishing schooners in the background. The other picture shows the final struggle of an infuriated swordfish that has been hooked by two men in a small dory, one of whom is about to give the final thrust with a long gaff. Among other merits, the paintings are remarkable for their faithfulness to detail.



This Wall Painting of a Fishing Crew Hauling a Seine on the Banks Adorns the Interior of a Boston Fish Stall and Is the Work of an Amateur Artist Who Handles Fish and Never Took an Art Lesson

Another Mural Painting by the Artistic Fish Handler, Depicting the Last Struggle of a Swordfish About to be "Gaffed" by One of the Men in the Dory

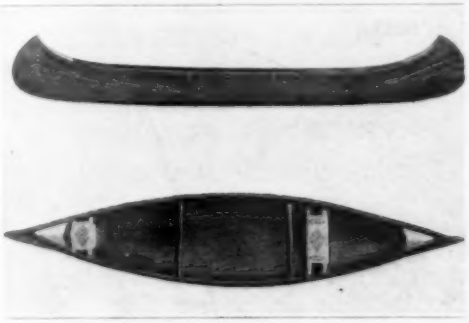
STANDARD SET OF WORDS TO DESIGNATE COLORS

The limited number of English words by which various shades and tints of color can be accurately designated is being supplemented by means of a color card issued by the Textile Color Card Association. A movement is on foot to introduce this standard generally among selling agents, millmen, and any others who are especially interested in the question of colors. There are 132 different hues on this card and each is given a name. Up to the present time every season has witnessed the introduction of some new color term used to designate a particular shade which is being featured by a certain manufacturer of fabric, millinery, or other lines of goods. This inevitably causes much inconvenience and misunderstanding. If the standard card referred to becomes widely

known it doubtless will be of great assistance in expressing color thought. Already 140 firms have adopted its nomenclature.

RIBLESS, SEAMLESS CANOES OF THREE-PLY VENEER

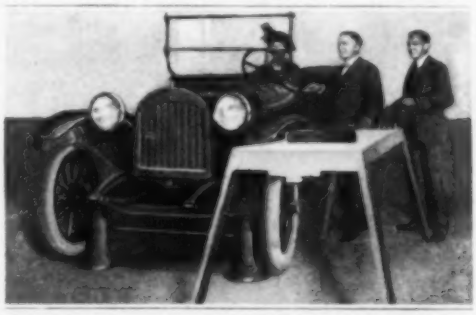
Canoes without ribs, made of three-ply veneer which is molded into shape in metal forms under hydraulic pressure, are about to be placed on the market by a Ludington, Mich., manufacturer. The veneer for the craft possessing these distinctive features is made with the aid of waterproof glue. The boats are described as strong, very light, difficult to puncture, and not subject to weather-checking when laid up for the winter. Since each one is made of a single sheet of material there are no seams, except at the extreme ends. The use of veneer makes possible very beautiful grain effects. The seats are made of the same material as the body.



Ribless Canoes of Three-Ply Veneer, Molded under Hydraulic Pressure: Strength, Durability, and Lightness, It is Claimed, are Possessed by This New Type of Craft

AUTO DRIVING TAUGHT BY NOVEL METHOD

A practical method of teaching novices to drive an automobile without leaving the store has been devised by the manager of a Los Angeles agency. The car used for the purpose is blocked up so that the wheels are off the floor, and the exhaust is connected to a pipe that leads outside the showroom. Thus, with the motor in operation, a beginner seated in the car can learn to throw the clutch in and out, shift gears, accelerate or slow down the engine, apply the brakes, and so forth, just as though the car were actually running on the street. By a system of special signals, like those used in traffic regulation by the police, the instructor tells the novice what to do, then sees that it is properly done.



Teaching a New Owner How to Drive Her Car: Note the Series of Small Levers near the Instructor's Left Hand, Which Raise Signals at the Other End of the Table for the Pupil's Guidance

SLEDLIKE BASE FOR LAWN SPRINKLER

A simple device which lessens the inconvenience of moving a lawn sprinkler, consists of a sledlike base of galvanized iron, about 20 inches long, to which the sprinkler is securely attached. The rounded bottom of the support permits it to slide along over the grass with either end foremost. To transfer the sprinkler to a new location it is only necessary to pull it along with the hose, without stopping to turn off the water and then turn it on again.

Galvanized-Iron Base for a Lawn Sprinkler: With This Sledlike Support the Sprinkler can be Drawn from Place to Place While the Water is Running

OUTSIDE TRUSSES SUPPORT BURNER TOP OF NEW TYPE

Like a portion of a Zeppelin's framework, standing on end, rises the new type of burner top which is now manufactured in Everett, Wash., for sawmill burners. This cap is intended to catch the sparks from the bark and slabs that are consumed in the bottom of the big cylindrical furnaces. It is composed of heavy wire screening, held in place by overhanging trusswork. This steel frame is made up of numerous curved ribs fastened to the upper end of the sheet-steel cylinder, on the outside. These converge and form a domelike top, inside of which is the wire screening. In this form of burner top there are no interior obstructions to hold the heat, and no walk is required around it on which sawdust and fragments can accumulate and later, in burning, injure the burner. Repairs can be easily made from scaffolding between the truss beams.

New Type of Refuse Burner for Sawmills, Having a Screen Top Held in Place by an Outside Framework Composed of Curved Trusses

WAR MENUS LIMIT ENGLISH DINNER COURSES

Since the new antiextravagance laws of food control went into effect in England on Christmas Day, 1916, the number of courses which public restaurants are permitted to serve has been limited to three for dinner and two for luncheon. Meat, fish, and pudding or sweets are each counted as one course; soup, side dishes, and dessert of raw and dried fruit only, each as a half course. But the side dishes must contain no fish, meat, poultry, or game; otherwise each counts as a full course. For officers a maximum charge has been fixed, amounting to the equivalent of $1.35 for dinner and 85c for lunch. Bread, butter, cheese, and biscuits (crackers) do not count at all, so that the regulations are not likely to prevent anyone from getting a satisfying meal.

USED RAILS BRING SAME PRICE AS WHEN NEW

The high price of steel may be said to have wiped out the depreciation which resulted from 26 years' use of the rails in an electric car line, running out from Tacoma, Wash. This fact was brought out a few months after the company began to improve four miles of its track with new and heavier rails. The old 40-lb. rails were torn up and stored in the yard of the company. Since the war began some 260 tons have been sold to logging companies for $7,800, which is $30 per ton, or just what they cost when they were laid 26 years ago. Even the steel which formed the track at the curves, and ordinarily would be regarded as worth little, sold for half its original cost.

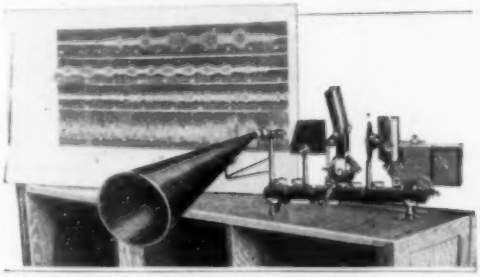
¶ The Philadelphia mint is preparing to store a total of $1,000,000,000 in gold bricks, it is said. Already $470,000,000 is deposited there and the rest of the billion is to be brought from the New York subtreasury, which is overflowing with gold coming from Europe.

SPUN GLASS AS INSULATION FOR STEAM PIPES

Spun glass has been successfully used in Germany recently as an insulating material to cover steam pipes. The method of installation is to wind the spun glass loosely around the pipes, between rings of asbestos placed at intervals, the insulation being then inclosed in asbestos braid and sailcloth and painted over with oil paint, or tar. The spun glass, consisting of fine glass threads, makes a loose, light, and porous wadding, which adds little to the weight of the pipes and makes a good insulating material because of the presence of air between its threads. It is not affected by vibration of the pipes, by high temperatures, steam, water, or acids, and retains its insulating power indefinitely.

VOICES OF GREAT SINGERS VISUALIZED FOR STUDY

Sound vibrations produced by the voices of some of the world's foremost singers were visualized through the medium of an ingeniously arranged projection apparatus and shown on a stereopticon screen recently for the study of delegates attending a convention of scientists. The device that was employed for this purpose was fitted with a delicate gauze diaphragm through which the sound waves passed, causing it to vibrate. The image of the oscillating diaphragm was cast onto a revolving triangular mirror by a series of intermediate reflectors, and in turn projected upon a screen where it was shown magnified 40,000 times.



Records Showing the Vibrations of Different Singers' Voices Appear on the Chart Back of the Projecting Machine

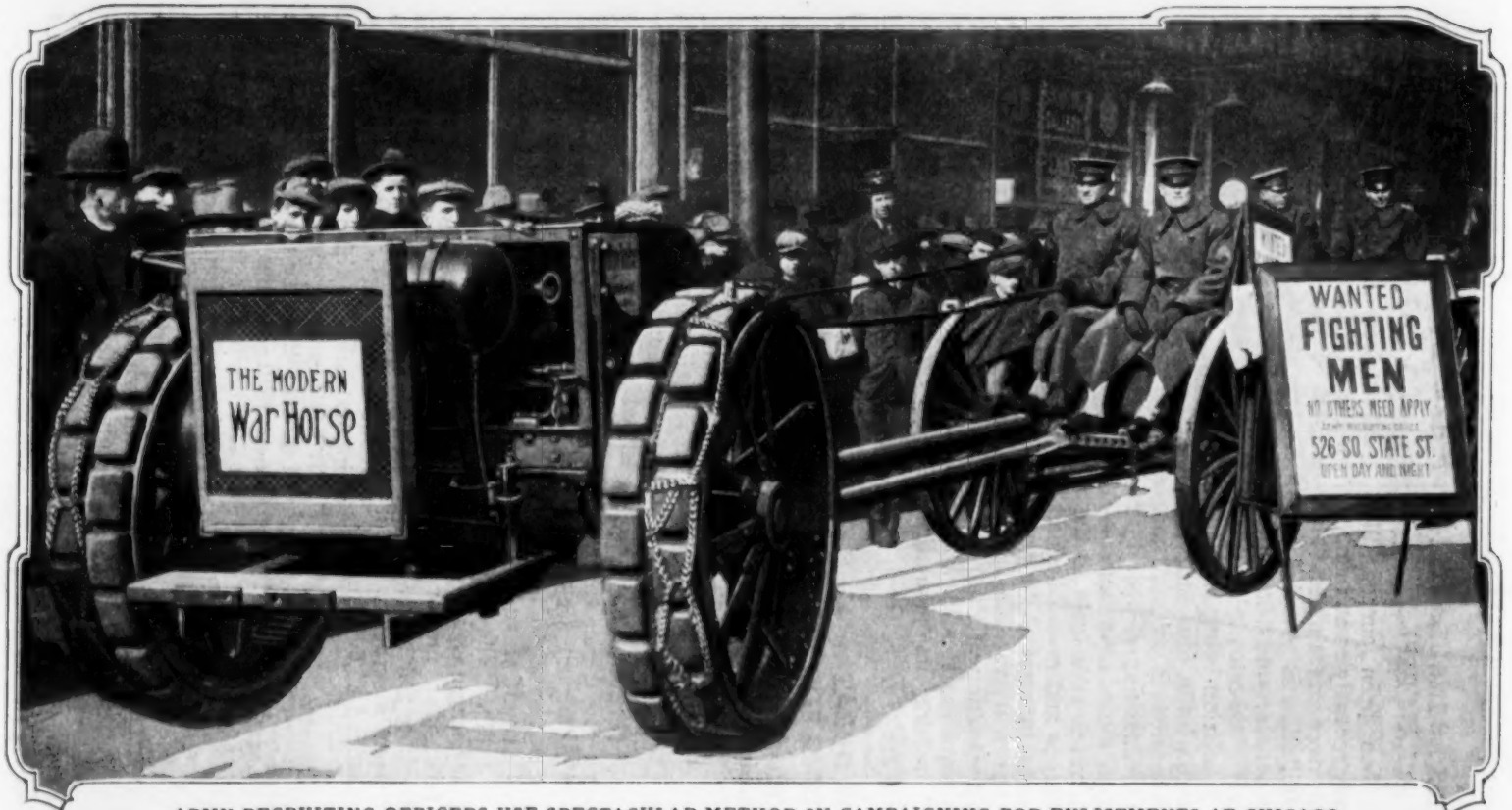
PRIZE WHITE DAHLIA GIVEN TO CALIFORNIA CITY

As a token of the affection he holds for the city, Luther Burbank, the plant wizard of the Pacific coast, recently

Bulb of the Champion White Dahlia being Presented by Its Creator, Luther Burbank, to the Chairman of the Oakland, California, Chamber of Commerce

presented to the people of Oakland, Calif., the bulb of the largest white dahlia that, so far as is known, has ever been produced. Picturesquely enough, the planting of the flower is to be made a gala event that will probably be observed on May Day. According to plans, a holiday will be proclaimed and the school children of the city marshaled together to welcome the naturalist. It is thought that the dahlia will be placed in City Hall Plaza, a public park which it is proposed to make symbolic of the city. Some of the other towns throughout the United States bearing the name of Oakland have made known their desire of contributing oak trees to this municipal garden. It has been suggested in Oakland that bulbs of the city's official flower, the new white dahlia, be presented to the sister towns in return as a mark of appreciation for their friendly gifts.

¶The construction of another government wireless station connecting the United States with its insular possessions, has been completed at Tutuila, placing the Samoan Islands in direct communication with Honolulu.



ARMY RECRUITING OFFICERS USE SPECTACULAR METHOD IN CAMPAIGNING FOR ENLISTMENTS AT CHICAGO

DRIVING a mechanical horse through the streets of Chicago to attract "fighting men" to the army recruiting stations: The powerful tractor, to which a field gun and caisson were hitched, was controlled entirely by two reins in the hands of a driver. It was taken through the congested "loop-district" thoroughfares with perfect ease. The plan was employed daily for a fortnight and apparently netted good results, for during the period large numbers of volunteers filed into the recruiting places. Although still little known, the machine is not a new type. Primarily it is intended for agricultural purposes and as a farm tractor has previously been described in this magazine. It is sufficiently striking in appearance and operation, however, to prick the curiosity of the street crowds, and in this capacity it performed valuable work for the army.

PREPARING FOR EVENTUALITIES AFTER BREAK

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In Many of Our Large Cities the Patriotic Spirit Shown by Women of Late has Amounted to More than Idle Conversation, as is Incompletely Indicated by the Picture Above, Which Shows Members of the Women's Reserve Drilling on the Roof of a New York Hotel

Immediately Following the Severance of Diplomatic Relations with the German Empire, the New York Naval Militia was Called Out to Guard the City's Bridges and Water-Supply System against Possible Molestation. Among the Men Who have Thus Faced Stinging, Snow-Laden Winds to Protect Gotham Property Are Members of Some of the City's Wealthiest and Most Prominent Families. The Photograph Below Shows Some of the Militiamen and a Three-Inch Gun Stationed by the Williamsburg Bridge on the Manhattan Side

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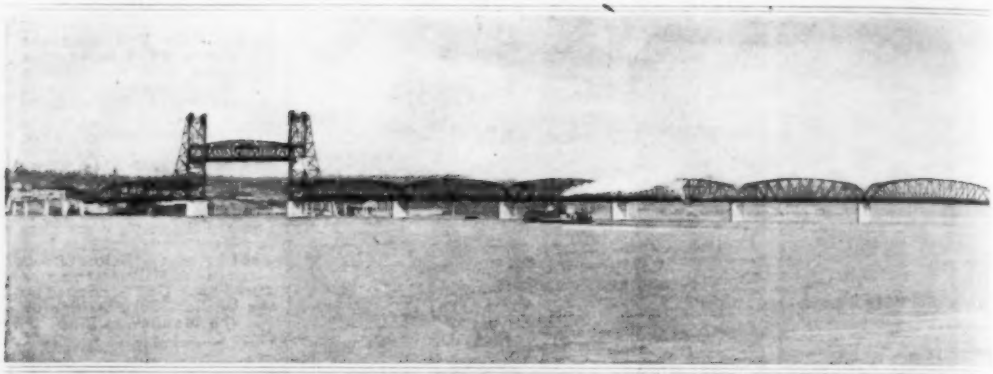
The German Steamer "Liebenfels" Awash in Charleston Harbor: The Sinking of the Vessel, Which had been Held in Port since the Outbreak of European Hostilities, Occurred When It Became Self-Evident That Washington would Break Off Relations with Berlin. There Seems to Be Little Doubt That the Boat was Scuttled by the Captain in Compliance with Orders Issued by the German Admiralty. The Engines of Several German Vessels at New York and Other Ports were Disabled by Their Crews



Motor Cars and Other Vehicles can Now Proceed from Portland, Oregon, across the Columbia River Planning, an Interstate Bridge has been Erected to Span the Waterway That Separates the Two States.

AIR PROPELLER PUSHES ICE CAR AT SPEEDY CLIP

Twenty-five miles an hour is easily attained with a motor-driven ice car that is used by a New Jersey devotee of winter sports. The vehicle is a stanch, simply designed sled carried on three runners, one of which is situated at the front and controlled by a steering wheel mounted under the streamline hood that partly shields the driver from the wind. A two-cylinder motorcycle engine, mounted at the rear, turns an aerial propeller. On the smooth surface of a frozen lake or river, the sled is in its element. Well-beaten snow-covered roads are also open to it, but, as is obvious, the fastest and most invigorating "bobbing" is to be had on the ice.

Few Winter Sports, Aside from Good Coasting, Offer More Really Enjoyable or Invigorating Recreation than Motor Sledding with Some Vehicle Like This

TOY INDUSTRY IN AMERICA GROWS RAPIDLY

Recent official statistics show that the growth of the toymaking industry in the United States since the grandfathers of the present generation were children has been remarkable. While the population has grown but 219 per cent since 1859, the per-capita expenditure for toys has increased by 1,165 per cent. The toy factories have increased in number from only 12 in 1859 to 290 in 1914—the year of the latest returns—and the annual output has increased in value from $184,000 to $13,757,000. In 1859 nearly twice as many toys were imported as those of domestic make; 20 years later we were making twice as many as we imported. In 1914 the output of American toys was 1.6 times greater than the toy imports, and since the European war began the proportion of domestic toys in the market has steadily increased.

GREAT COLUMBIA RIVER BRIDGE IS COMPLETED

Within recent weeks the long-needed interstate bridge, spanning the Columbia River and connecting Washington and Oregon, has been opened. Erected at a cost of about $1,750,000, it replaces a legendary natural bridge of Indian lore and establishes the first artery, other than a ferry system, for general vehicular traffic between Vancouver and Portland. The bridge proper is

to Vancouver, Washington, without Making a Long Detour or Employing a Ferryboat. After Years of and Has of Late been Opened. It Is the Only Structure in the Vicinity That Accommodates General Traffic

3,530 ft. long, but including the approaches it has a length of nearly four and a half miles. Bridging the main channel of the stream there is a 275-ft. lift span that provides a clearance of 150 ft. above ordinary high water.

ADULTS AT PALM BEACH RACE IN BOYS' MOTOR CARS

Almost every adult possesses a fondness for toys and playthings of a mechanical nature and if given an opportunity will operate them as enthusiastically as any boy—a fact which one of the present season's fads at Palm Beach has quite thoroughly demonstrated. A country club at this famous Florida resort has been the scene of most amusing motor-car races, the "racers" used being the same as described on the children's page of Popular Mechanics Magazine recently. These little cars, which are built for boys and girls, are each propelled by a motor wheel attached to the rear. The contests were held on the seashore, and the drivers, who included some of the best-known men and women in Palm Beach's social set, were able to make quite surprising speed records.

¶To a dealer in New York was consigned not long since what has been pronounced the largest single shipment of Russian caviar forwarded to the United States in many years. It consisted of 183 boxes and 66 kegs.

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Men Racing in Cars Built for Juveniles, One of the Latest Fads at Palm Beach: These Tiny Vehicles have been Nicknamed "Red Bugs." Each is Propelled by a Motor Wheel Attached to the Rear

REALISTIC LANDSCAPE SEEN ON FROST-COATED WINDOW

Quite an interesting example of the strange and even weird patterns in which frost occasionally forms on panes of glass during freezing weather is afforded by a formation that occurred on a store window in a western town not long ago. It bore a striking likeness to a foliage-screened ravine in some tropical jungle. A remarkable aspect of this particular design was that it presented a complete picture with high lights and shadows, unusual perspective, and atmosphere.

Only Slight Imagination is Required to See in This Photograph of a Frost-Painted Window a Truly Beautiful Picture of a Fern-Filled Ravine

SOLDIERS GIVEN COMPASSES OF LIQUID TYPE

During the European war large numbers of liquid compasses have been manufactured as pocket instruments for army officers. Although the type has long been a common one, its adaptation to this form is in a certain degree interesting. As might be expected, the reason for using the liquid compass, in preference to the sort in which the card is held solely on a pivot, is that the dial ceases its oscillations and comes to rest more quickly than in the latter instrument.

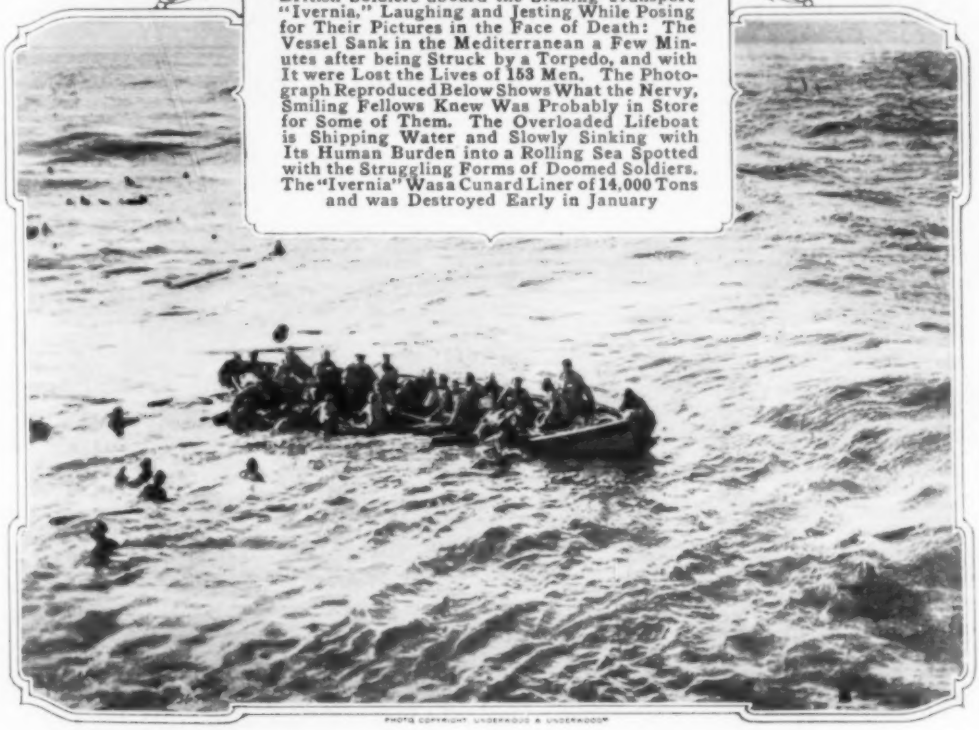
FLORIDA WHARVES HAVE NOVEL BULKHEAD

The new wharves at Commodore Point, Jacksonville, Fla., work on which was begun more than a year ago, are provided with a concrete and steel bulkhead wall of a type which has been little used heretofore. This bulkhead is part of a terminal situated at a bend in the St. John's River, and extends out some distance from shore. By filling in behind it the terminal's area is enlarged by several acres. The wall, which is a mile or more in length, is provided with steel I-beams driven at intervals of 3 ft. to a depth of 34 ft. or more below low tide, in most instances penetrating rock. Fastened back of these supports is a continuous interlocked row of steel sheet piling. Concrete is filled in between the I-beams, so that all the steel except the outer edge of the I-shaped posts is protected from the salt water. The concrete facing, while designed primarily as a protection, naturally adds strength to the wall. Extending between the I-beams, and also incased in the concrete, are wales connected by tie-rods to piles several feet to the rear. Just back of the wall also is a relieving platform, supported by piles, which was installed before the filling was completed. This big new terminal is privately owned and is only a short distance from the city's shipping center.

¶There are scarcely enough houses to go around in some Scandinavian cities at present because the shortage of building material has halted construction work, and the population has been greatly increased by foreigners seeking refuge in neutral territory.

GRIM MOMENTS FOLLOW SINKING OF TRANSPORT

British Soldiers aboard the Sinking Transport "Ivernia," Laughing and Jesting While Posing for Their Pictures in the Face of Death: The Vessel Sank in the Mediterranean a Few Minutes after being Struck by a Torpedo, and with It were Lost the Lives of 153 Men. The Photograph Reproduced Below Shows What the Nervy, Smiling Fellows Knew Was Probably in Store for Some of Them. The Overloaded Lifeboat is Shipping Water and Slowly Sinking with Its Human Burden into a Rolling Sea Spotted with the Struggling Forms of Doomed Soldiers. The "Ivernia" Was a Cunard Liner of 14,000 Tons and was Destroyed Early in January



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One Corner in a Sun-Flooded Day Nursery That has been Established at a Large Munition Plant in France: Hundreds of Women Workers are Engaged in Making Shells, and Many of Them Are Mothers. They Carry Their Babies to the Plant Daily When They Report for Duty and Leave Them in Charge of Competent Nursery Attendants during the Working Hours. In This Way the Children are Properly Cared For and the Mothers Kept at Ease Mentally

Photo Copyright International Film Service

On Some of the Battle Fronts the Past Winter Proved to Be the Most Rigorous Experienced during the Great War. The Picture Above Shows the Flooded Condition of a Russian Second-Line Camp Somewhere along the French Front. Heavy Snowfalls, Thaws Followed by Freezing Temperatures and Bitter Winds, Then More Snow and Another Thaw: These have Been the Climatic Changes That have Caused Much Suffering

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Despite Size and Appearance, This Is Not a Picture of the Crater of an Inactive Volcano. Instead It Is a Hole Nearly 300 Feet Long and 180 Feet Wide Torn in the Ground by the Terrific Explosion of a French Mine Planted beneath the German Trenches on the Somme Front North of Combles. Four Wounded Men Were the Sole Survivors of Two Companies—or 500 Soldiers—of Prussian Infantry, and of These Two Died the Following Day

Kneeling in the Sand over a String of Sacred Beads, a Moslem Soldier Offering His Prayers to the Great Prophet. He is Turned toward the East and Apparently Is Oblivious of the Christians about Him

Whether He Is Successful, or Unfortunate, the Lot of a Spy Is a Hard and Unappreciated One. A False Move Often Means Death, as It Did for These Two Fellows Who Failed to Escape the Suspicion of the Russians and were Captured. The Last Rites are being Performed by a Priest While Members of the Firing Squad Await Their Unpleasant, but Necessary, Task

PHOTO COPYRIGHT, UNDERWOOD & UNDERWOOD

The End of a Dramatic, but Common, Story: The Execution. The Two Spies have been Tied to Posts by the Soldier Who is to be Seen Running Out of the Range of Fire. The Rifles are Cracking. This Is a Picture Which might have been Taken Hundreds of Times, for Many Men have Died under Similar Conditions during the Present Conflict

UNUSUAL WAR PICTURES PASSED BY CENSOR

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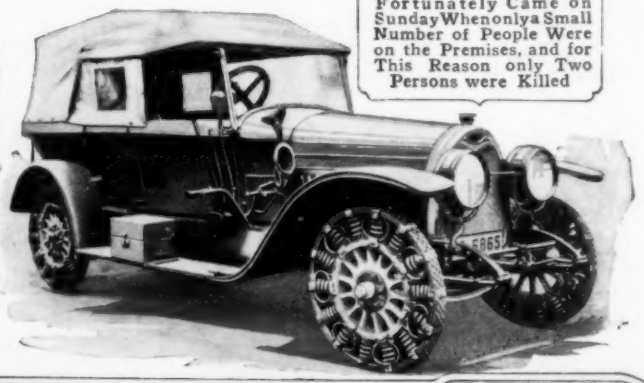
Débris of a Large French Munition Plant near Massy, One of the Suburbs of Paris, Which was Demolished by an Explosion That Occurred a Short Time Past. The Blast Fortunately Came on Sunday When only a Small Number of People Were on the Premises, and for This Reason only Two Persons were Killed

At the Right is Pictured a German Motor Car Equipped with Spring Wheels. It is Understood That These are becoming Widely Used Because of the Serious Shortage of Rubber, Which has Made the Manufacture of Tires a Difficult Problem. Information Explaining the Precise Situation has Not Passed the Censor



This Big Engine of Destruction Is an Italian Naval-Type Gun That was Captured by the Austrians. A Heavy Chassis and Caterpillar Wheels Support It, Enabling It to be Transported from One Point to Another. The Picture Serves to Bring Out Most Strikingly the Fact That No Gun Is Too Big for Field Operations in This Day

STRIKING PICTURES TELLING WAR'S PROGRESS

Since Germany's Campaign of Ruthless Warfare has Become Effective, Halifax has been Designated an Obligatory Port of Call for Neutral Transatlantic Shipping. The Picture Above Furnishes a Glimpse of the Harbor, Which is Protected from Submarines by a Steel Net Made Fast to the Pontoons That Are Visible in the Foreground

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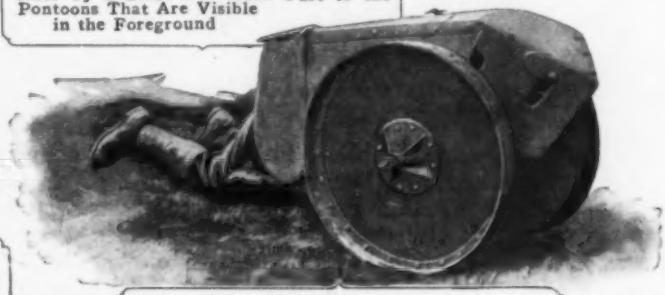
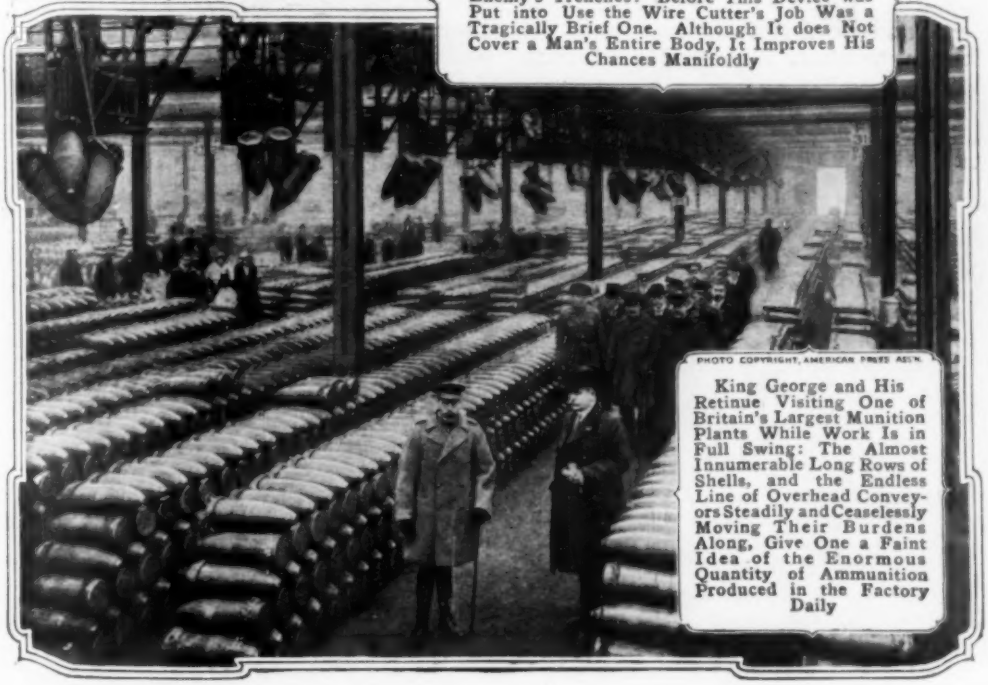
In a French Town Occupied at Present by the German Forces, Shields of the Sort Shown Here Render the Street Lamps Less Noticeable to Allied Airmen



Mobile Shield That Enables French Soldiers to Advance in the Face of Machine-Gun Fire and Cut Wire Entanglements Protecting the Enemy's Trenches: Before This Device was Put into Use the Wire Cutter's Job Was a Tragically Brief One. Although It does Not Cover a Man's Entire Body, It Improves His Chances Manifoldly



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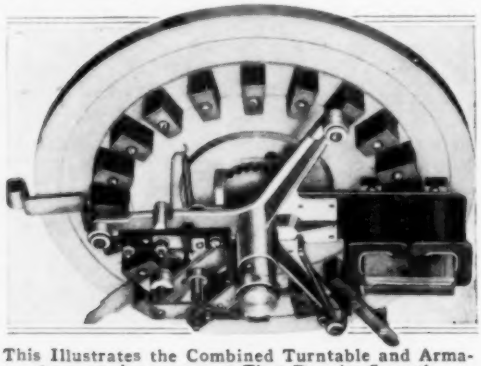
King George and His Retinue Visiting One of Britain's Largest Munition Plants While Work Is in Full Swing: The Almost Innumerable Long Rows of Shells, and the Endless Line of Overhead Conveyors Steadily and Ceaselessly Moving Their Burdens Along, Give One a Faint Idea of the Enormous Quantity of Ammunition Produced in the Factory Daily

GEARLESS ELECTRIC MOTOR OPERATES PHONOGRAPH

In a new slow-running electric motor that has been designed for operating phonographs, the armature

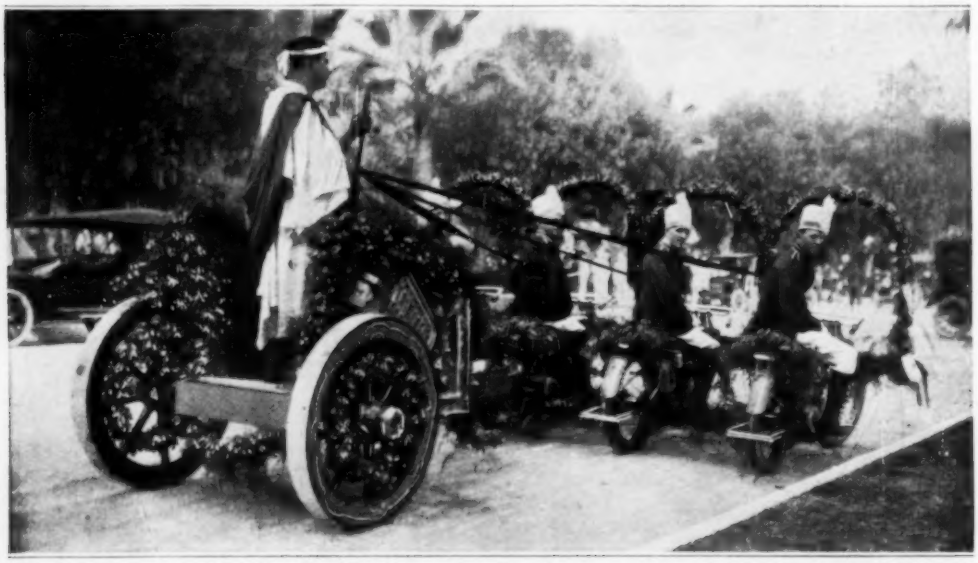


This Illustrates the Combined Turntable and Armature, an Arrangement That Permits Smooth Motion and Obviates Gearing

is a part of the turntable. This arrangement permits the latter to be of much heavier construction than is customary and also obviates the need of gears. Power is applied magnetically, and the turntable is driven with the smooth, steady motion that is characteristic of a flywheel. A constant speed is maintained, irrespective of loads and voltages, by means of an electric governor that is used in place of the ordinary friction-brake governor. Because the motor consumes only a small amount of current it may be driven satisfactorily by a five-cell battery which under ordinary conditions will permit the playing of 1,500 or more records, it is said. The motor is so built that it is practically interchangeable with a spring motor of any standard make.

MODERN "BEN HUR" DRAWN BY FOUR MOTORCYCLES

Clad in a Roman toga and swinging a long-lashed whip, an impersonator of Ben Hur was drawn through the streets of Pasadena recently in a chariot of Roman design, but four motorcycles with riders, instead of fleet horses, drew the conveyance. The novel conception proved one of the hits of the rose tournament of which it was a part. The chariot and motorcycles were artistically decorated with flowers and greenery, and above the head of each costumed rider of the two-wheel power vehicles extended an arch of green. In spite of the slow pace of the procession—two miles an hour—the machines kept their place without difficulty.



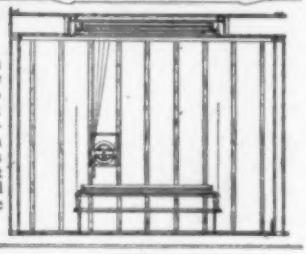
Unique Float in the Recent Pasadena Tournament of Roses in Which "Ben Hur" and His Roman Chariot were Drawn by Four Decorated Motorcycles with Costumed Riders

The Ceiling Bed can be Installed in Any Room, Sun Parlor, or Sleeping Porch and be Entirely Concealed from View at All Times Except When It is Lowered for Use

When the Bed is Lowered, as Shown Herewith, the Space It Occupies in the Ceiling is Covered by a False Panel Which Drops into Place Automatically

DISAPPEARING BED HIDDEN IN CEILING OF ROOM

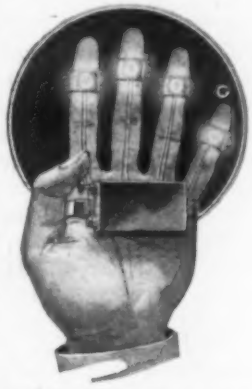
For those who own small bungalows or cottages which lack guest rooms, some form of disappearing bed usually is convenient when emergencies arise. Certain advantages are apparently to be found in one which is hidden in the ceiling of a room when it is not in actual use. This arrangement does not usurp wall, closet, or floor space. Two false panels are employed, so that the place of concealment is always covered. When the bed is lowered to the floor one of these panels descends and seals the opening. The other one, which is held below the bed, fits into place when the latter is raised. The bed is held in a box installed between the ceiling and the floor above. Cables attached to its four corners pass around pulleys mounted in the retaining box, extend through channels cut in the joists, and are made fast to a winding drum fitted in one of the side walls. Access to this is given by a small, neat door and by turning a crank the bed is raised or lowered into position. Either of these operations requires but a moment's time and can be accomplished without any material physical exertion.



The Illustration Above Shows How the Bed Fits into a Receiving Box Fitted in the Ceiling, While Diagram at Right Explains the Arrangement of the Cables and the Location of the Winding Drum

FINGER-TIP LIGHTS FOR THEATER USHERS

With a small electric battery and connections to light bulbs worn on the finger tips, an usher in a darkened theater or hall may now signal to a doorkeeper the number of empty seats available, so that the proper number of persons may be admitted to fill them. This device, recently patented, saves walking to and from the door to carry the message and conduct the persons admitted to the distant seats. It also saves considerable time in seating an audience.



HAND BAG SHELTERS LAP DOG FROM COLD

Hand bags for lap dogs are among the very latest accessories devised for the amusement of society folk and the comfort of their pets. The extremely cold winter weather of a few weeks ago even chilled Florida air for a time, and forced the Palm Beach colony to don garments not altogether summerlike. At the same time some went so far as to shelter their pug-nosed little lap dogs in spacious hand bags.

INCREASING BUSINESS OF THE PATENT OFFICE

The business of the Patent Office during the year 1916 was greater than in any previous calendar year of its existence. From the report of the Commissioner of Patents, recently submitted to Congress, it appears that the total number of patents issued during the year ended December 31, including designs and reissues, was 45,927. The cash receipts from all sources amounted to $2,343,540.94 and the expenditures to $2,115,367.91, leaving a surplus for the year of $228,173.03, which was deposited in the U. S. Treasury and increased the total net earnings of the Patent Office since the year 1836 to $8,013,679.51. There were 71,033 applications for patents filed during 1916, and 23,296 patents expired. The applications allowed numbered 19,835, and 11,174 were forfeited for nonpayment of final fees. The grand total of patents granted since 1836, when the present series of patent numbers began, was 1,166,419; design patents 48,358, and reissues 14,040. The patents granted to residents of foreign countries in 1916 numbered 3,767, of which Great Britain and her colonies were credited with 1,882, Germany with 847, France with 309, Switzerland with 132, and Sweden with 114. The average time that applications upon which patents are granted remain in the Patent Office before final action is 21 months. A total of 117,298 applications were in the office December 31, pending action.

SKIRT WITH LEGGINGS FOR OUTDOOR WOMEN

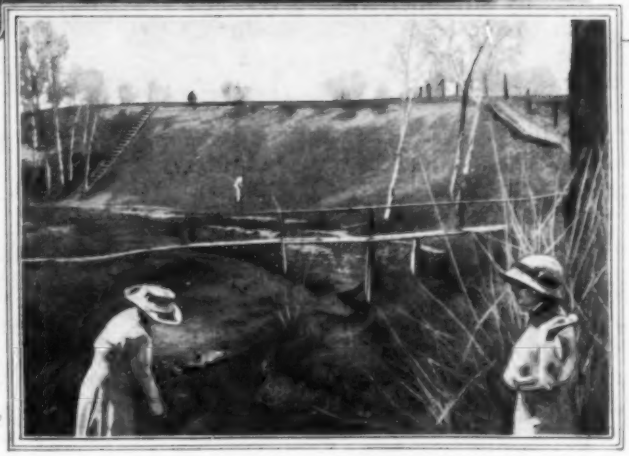
A one-piece combination of skirt and leggings is now available for women who are fond of hiking, or any form of outdoor sport in which freedom of movement is desired. The new garment is both modest and attractive. The leggings have gaiter straps and button on the outside almost to the knee. For riding, driving, golf, tennis, and other active sports, the combination is pronounced just the thing.

¶Tramways, lake barges, and caterpillar tractors were employed in turn in transporting cement to two remote dam sites in the Sierra Nevada Mountains recently, bringing the cost of the material up to $7.50 per barrel.

WHERE SPRINGTIME DRAWS DENVER GOLFERS

In the Attractive Home Above, the Denver Country Club, Which is Actively Affiliated with the United States Golf Association, Is Host the Year Around in Gay Affairs. The 18-Hole Course, One of the Best in the West, Has an Exceptionally Baffling Hazard before the Fourteenth Green. As is Shown at the Left, the Famous Cherry Creek, with Menacing Trees on Either Bank, must be Crossed Obliquely

The Hospitable Atmosphere of Real Country Life is to be Found at the Lakewood Country Club, Where Many of Denver's Devotees of Golf Spend Delightful Hours on the Course and about the Clubhouse. There Are Spacious Verandas and Inviting Lounging Rooms with Cheery Big Fireplaces That Glow with Fellowship When the Air Is Crisp. On the Links, before the Seventh Hole, a Sporty Hazard is Met. The Green cannot be Seen from the Tee, for It Is on the Opposite High Bank of the Stream Pictured to the Right



WOUNDED WAR DOG FITTED WITH WOODEN LEG

Within recent weeks a crippled survivor of the battle of the Aisne has reached America. He is a war dog and

The Dog Limps When He Walks or Runs, but is Not Seriously Hampered in His Movements

wears an artificial limb. The animal was used in the French army and wounded by shrapnel while carrying a dispatch to the first-line trench during the opening hours of the great onslaught. With his left foreleg torn away, the dog struggled ahead and carried out his orders. At about the same time the animal's master was wounded. Subsequently, however, he got possession of the dog and had an artificial limb made for him at Paris. A silver cap was used to incase and protect the stump, and this in turn was fitted into the aluminum-lined socket in the top of the peg leg. A strap attached to the limb and fastened about the animal's body keeps the wooden member in place.

SIMPLE MACHINE RECOVERS TIN FROM OLD CANS

In view of the prevailing high cost of tin, some importance is attributed to an apparatus developed in England for recovering this metal and solder from used cans. It is composed of an inclined cylinder that revolves in a brick-lined one and is heated by a series of oil or gas burners. These are arranged so that from the upper to the lower ends of the drum the temperature gradually increases. The machine is continuous in operation, cans being fed by a hopper into the high end of the cylinder and discharged at the opposite extremity through a chute. The molten tin and solder flow through channels that carry them out of the chamber.

CHAUFFEUR'S ODD METHOD OF KEEPING WARM

There are queer ways of doing everything, and among them is the way an Iowa physician's chauffeur keeps himself warm during zero weather while the doctor calls upon rural patients. No mention has been made of the inhospitality of Iowa farmers, but for some reason this particular driver has the habit of throwing a fur robe over his body and curling up on the rounded top of the motor-car hood, there to absorb the heat radiated by the engine. There is no reason for doubting that he keeps fairly warm, but there possibly is cause to question his comfort.

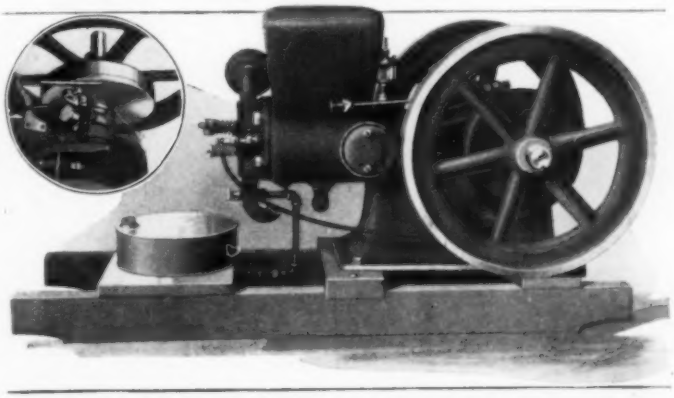
During Cold Weather This Chauffeur Rests on the Warm Hood of the Motor Car When Long Stops are Made

ST. PAUL FOLKS AGAIN FROLIC IN THE SNOW

LIKE New Orleans' Mardi Gras, St. Paul's winter carnival is becoming a picturesque and rejuvenating festival. Singularly these two gala events are held respectively at the headwaters and the mouth of the Mississippi. The photograph reproduced herewith was taken a few weeks past when St. Paul's gayeties were at their height. It shows a throng of several thousand devotees of the outdoors costumed and passing in review before the king of the carnival.

MAGNETO OF CIRCULAR TYPE FOR GAS ENGINES

In a stationary gas engine of recent design the magneto used is of a new circular type, applied directly to the crankshaft, inside of the flywheel. There are no special gears, brackets, or other fixtures, as with the ordinary horseshoe magneto, and being of the high-tension type it requires only one cable to the spark plug. The timing of the spark is accomplished by rotating the magneto, which, being entirely inclosed, is claimed to be oil-proof, dust-proof, and rain-proof, while its location on the engine protects it against accidental knocks or breakage. The engine, it is said, starts readily on this magneto, which the designers assert is both positive and durable, giving a good hot spark that can be depended upon. While no battery or spark coil is required, the new magneto can be used with batteries in a dual system of ignition.



Gas Engine with New Circular Type of Magneto, Which may be Seen Mounted on the Crankshaft Inside of the Flywheel

DEATH'S-HEAD AND HUMOR MAKE SIGNS EFFECTIVE

Originality and grim humor have been displayed by a county-road engineer in designing signs for a link of the Southern National Highway, not far from Asheville, N. C. At one curve in the fine asphalt-concrete thoroughfare is a boldly lettered notice which reads, "One Half of the Road Is Yours. The Other Half Mine." At another point in the same vicinity, near a sharp curve, is a board bearing a death's-head, below which are these words, "Just around Curve."

Two Signs on a Section of the Southern National Highway near Asheville, North Carolina, Which Strikingly Set Forth the Rules and Dangers of the Road

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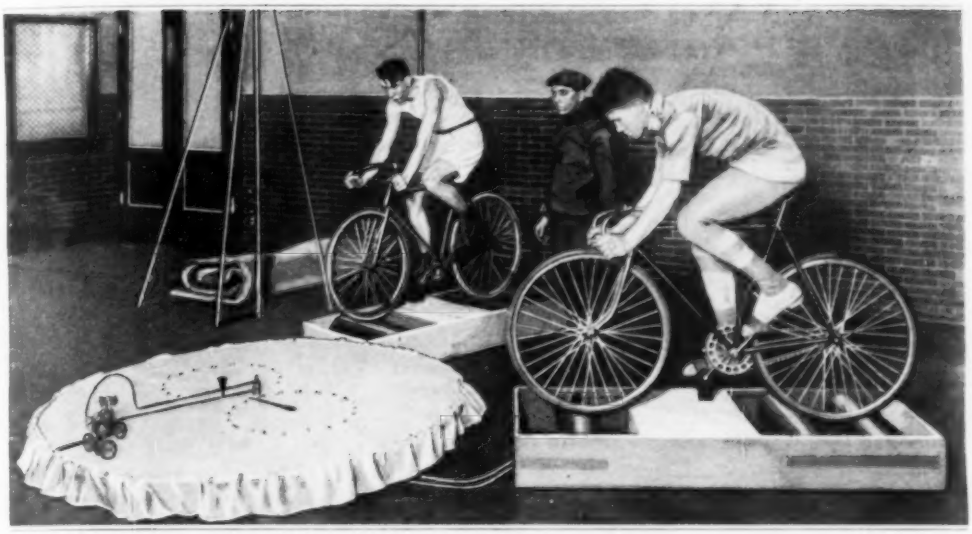
Because of the shortage of technically trained men for service in Russian munitions plants, 47 Russian women, formerly technical students, have been granted the degree of engineer and will serve in place of men.

MAGNET USED TO OVERCOME VIBRATION OF MERCURY

Frequently it is highly important that the mercury contained in certain scientific instruments such, for instance, as a barometer, be restrained from vibrating when subjected to some disturbing force. If the support of the vessel shakes slightly, small ripples occur on the surface of the liquid and often cause trouble when accurate observations are required. A physicist connected with the Bureau of Standards at Washington has found that such disturbances, as well as greater ones involving the whole of the mercury, can be largely, or entirely, overcome by subjecting the element to a strong magnetic field. The direction of the latter, it has been found, should be at about right angles to that of the motion of the quicksilver. The movement of the liquid across the magnetic lines of force has a tendency to develop an electric current, and the resulting reaction has the effect of stopping the motion of the mercury. This method may be used when it is wished to obtain accurate adjustments of mercury surfaces at sea and elsewhere.

NOVEL SPEED INDICATOR FOR STATIONARY RACERS

Exciting races, the participants in which sit on stationary bicycles, are held in the gymnasium of the Grand Rapids, Mich., Y. M. C. A., with the aid of a novel speed indicator. Two bicycles are each installed on a set of rollers which are connected by means



A Speed Indicator Which Makes Possible Exciting Races on Stationary Bicycles: The Two Toys Travel around Their "Half-Mile" Track Proportionately as Fast as the Contestants Operate Their Bicycles

of speedometer devices with a miniature race track set in full view of the riders. Two toy bicycles, with riders, are mounted on this track and are connected with the speedometer attachments in such a way that the large bicycles drive them round the track. One trip of the toys around the course represents half a mile of bicycle riding. The fact that the speed of each tiny bicycle is governed by the rate at which the corresponding large bicycle is driven, gives all the zest of an outdoor race to the contests.

ROOMY AIR-DRIVEN BOAT FOR TEXAS STREAMS

The problem of navigating a good-sized boat in the shallow streams of Texas timber lands has been solved by a river boatman of Deweyville, Tex. He has applied the aeroplane method of propulsion to a handy craft, 36 ft. long and 9 ft. beam, that draws only 8 in. of water and attains a speed of about 15 miles an hour under favorable conditions. An 8-ft. air propeller is mounted at the stern and driven by a

This Boat Draws Only Eight Inches and Makes a Speed of Fifteen Miles an Hour in the Shallow Streams of Texas, with the Aeroplane Propeller Seen at the Stern. The Builder is Standing on the Forward Deck

6-cyl. gasoline motor in the canopied cockpit. There is a comfortable cabin and wheelhouse, and a gangway all around the deck. The boat was built for the use of a southern lumberman in visiting his camps along the streams, where a launch of greater draft could not be navigated.

SMALL WINDMILLS USED BY HERRING FISHER

In fishing for herring on the California coast small hooks are baited with bits of bright-colored yarn, which

This Small Windmill is Used by the Fisherman to Keep Herring Bait Spinning in the Water, and He has Made Some Record Catches by Its Aid

must be kept moving in the water to attract the fish. An Ocean Park man grew tired of constantly jigging his lines by hand and now uses small wooden windmills, which answer the same purpose. There is usually a breeze at the piers where he fishes, and when connected to a fishline the mill spins merrily, keeping the baited hooks in motion until a fish is securely hooked, when its efforts to escape stop the mill, and the inventive fisherman does the rest. Nibbles have little or no effect on the windmill, so that there are few false alarms, and other fishermen are adopting the labor-saving system.

VEGETABLE-IVORY WASTE AS A STOCK FOOD

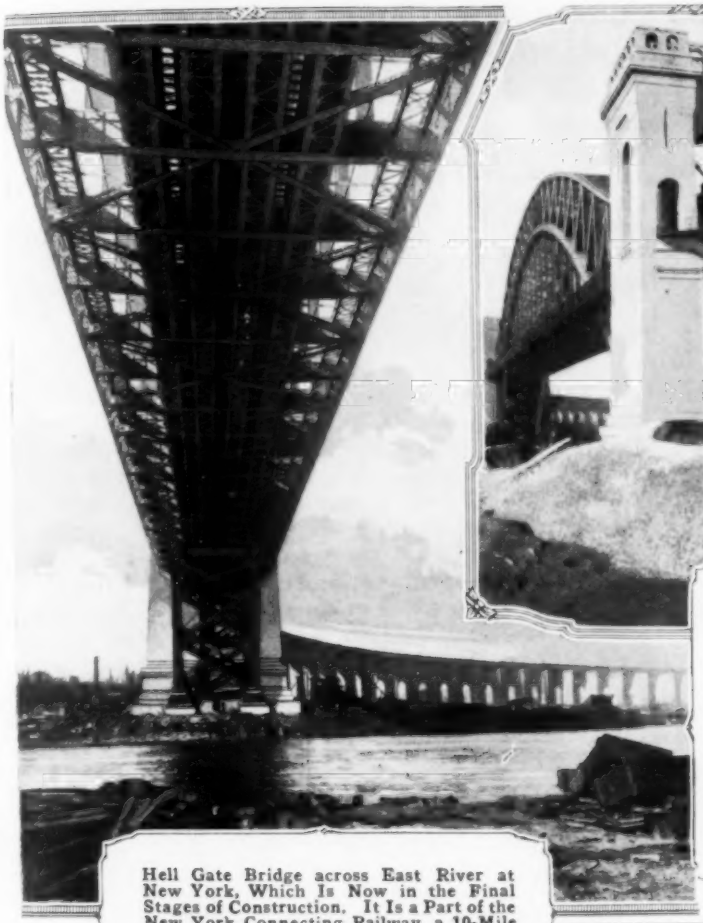
The feeding of sawdust to stock in the place of grain, which has often been the theme of jokers and comic supplements, may prove to be a practical proposition after all. But the sawdust to be employed as food will be of a particular kind, namely from vegetable-ivory nuts. This country imports about 10,000 tons of these nuts annually for use in making buttons. Now it is proposed to utilize the considerable waste, in the form of sawdust, chips, and turnings, that results from the making of buttons, by mixing it with grain for cattle. Experimenters for the Massachusetts Agricultural Experiment Station have found properly prepared vegetable ivory apparently quite suitable for such purposes, and stock fed on it seem to be benefited thereby.

SALT TREATMENT FOR IRON FOUNDRY LADLES

By melting a small quantity of common salt in iron or steel ladles and spreading it over the inner surface, a Birmingham, Ala., inventor claims that the metal ladles can be used for melting copper or bronze, which usually requires expensive crucibles of graphite or some other material that will withstand intense heat. It is said that copper can be melted in a few minutes in an iron or steel crucible so treated with salt, whereas in common practice from one and a half to two hours are required. The salted metal crucibles can also be used for pouring the molten copper, as they are not affected by the fusing temperatures. The process has been patented.

¶A seaplane, attached to the aviation station at Pensacola, Fla., ascended to a height of 10,500 ft. recently, establishing a new altitude record for craft of that type. A flight to a height of 11,000 ft., made some months ago, was not officially acknowledged as a record.

GREAT HELL GATE BRIDGE NEARS COMPLETION



Hell Gate Bridge across East River at New York, Which Is Now in the Final Stages of Construction. It Is a Part of the New York Connecting Railway, a 10-Mile Line That is Carried for Nearly Half of Its Distance on Bridges and Viaducts

Side View of the Great Structure Which Shows Some of Its Imposing Architectural Features. The Bridge will Give New England Express Trains Routed to the South and West a Direct Path through New York City and will Also Allow Freight to be Shipped from South Brooklyn to New Jersey without being Carried through Manhattan

Including Its Approaches, the Bridge Is About 3,000 Feet in Length. This Picture Shows the Four-Track Roadway on One of the Long Viaducts. Work on the Connecting Road was Begun in 1912 and has Proved a Most Interesting Example of Modern Railway Engineering

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SELF-LIBERATOR PERFORMS HANGING HEAD DOWNWARD

Not content with liberating himself from a strait-jacket in the way that tricksters ordinarily do, a vaudeville performer in Cincinnati not long ago performed this feat while hanging, head downward, from the side of a skyscraper. Clad in one of the garments used to restrain violent prisoners and with his feet tied to a heavy rope, he was swung out over the street far above several thousand spectators. After three minutes of effort, the gymnast had freed himself from the strait-jacket, despite the handicap of hanging by his feet at a nerve-racking elevation.

LOCAL MAGNETIC POLE IN ALASKA

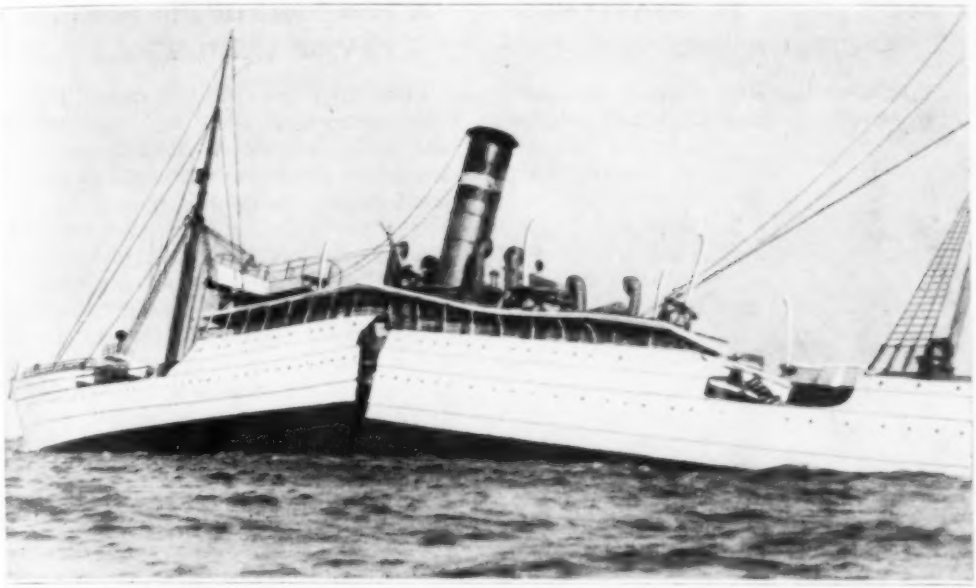
In common with a few other places on the face of the earth, Treadwell Point, Alaska, claims distinction in that it is a local magnetic pole. It is one of those localities in which scientists have found that a dipping needle stands in an almost vertical position. The phenomenon is due to some local condition, such as a deposit of ore possessing strong magnetic properties. It is said that when observations were made at Treadwell Point, in 1900 and again in 1907, the dipping needle stood practically straight up and down, the north pole pointing toward the earth. When a compass was moved about in a circle of very small radius surrounding a certain spot, it was found that it reversed its direction. The compasses on ships in the channel, a mile distant, are said to be deflected about 11° by this area, which possesses exceptional magnetic properties. Treadwell Point is not far from Juneau.

HUNDREDS OF CATTLE MAKE QUARTER-MILE SWIM

When there is a chance to take advantage of a short cut and thereby eliminate a tedious ride of several miles, a cow puncher rarely overlooks it. An instance of this, which may be interesting to the tenderfoot at least, occurred not long ago on a Montana range, near Grayling, where 2,000 head of cattle were made to swim a quarter of a mile across a neck of water in order to save a 13-mile trip around the shore line of Lake Hebgen. The animals reached the opposite shore easily.

Making the Start across the Quarter-Mile Stretch of Water

The Cattle Milled Until a Few Head were Rounded Up on the Opposite Bank. Then the Cowboys Started the Herd by Swimming Their Horses Alongside



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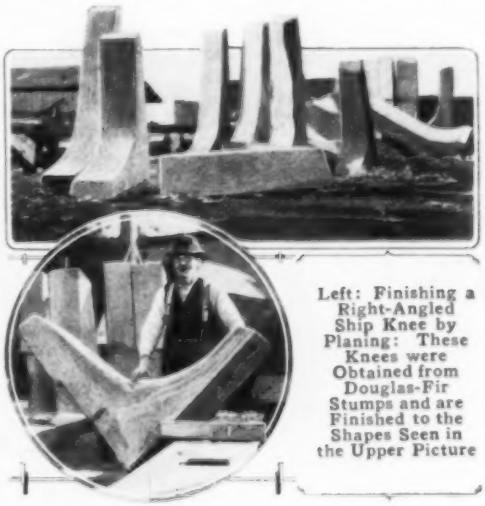
United States Army Transport "Sumner" Aground on a Shoal off the New Jersey Coast, Broken in Two by the Winter Waves, and Abandoned by the Government as a Total Wreck

GROUNDED ARMY TRANSPORT BREAKS IN TWO

When the army transport "Sumner" went aground on a shoal off Barnegat Light, N. J., early in the winter, hopes were entertained of saving it. The pounding of the winter storms, however, proved too much for it and it finally broke in two amidships. The machinery and much of the equipment being ruined, it was given up by the government as practically a total loss, further salvage operations being abandoned to the wrecking companies.

WOODEN SHIP KNEES MADE FROM FIR STUMPS

Recent activity in building of wooden ships has revived an industry in the timbered regions of the West, in the furnishing of ship knees, the angular braces which are an important part of a hull. They are obtained from the stumps of large trees, at the angle where the trunk and the root meet. Douglas-fir stumps are said to yield the finest and largest ship knees in the world, and as from 200 to 300 knees may be used in a single hull, there is a large demand for them among shipbuilders when their yards are busy. Most of the knees are required to have



Left: Finishing a Right-Angled Ship Knee by Planing: These Knees were Obtained from Douglas-Fir Stumps and are Finished to the Shapes Seen in the Upper Picture

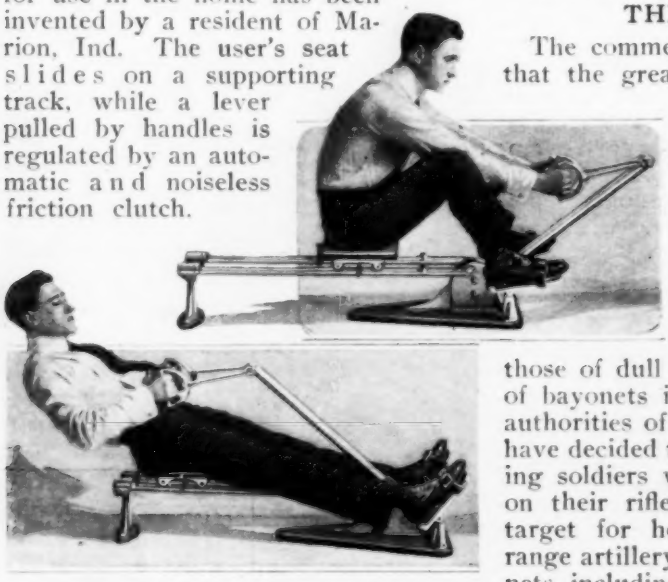
an angle of 90°, and are sawn from stumps grown in level ground, then finished by planing.

FOOT REST OR GUARD FOR USE ON SHOVELS

The labor of using a spade, or shovel, may be lightened considerably by the use of a foot rest, or guard, which a resident of Spokane, Wash., has designed to fit over the upper edge of a shovel blade on either side of the handle. There is a broad guard surface on which the pressure of the foot is exerted and a resilient front portion to hold the guard in place on the shovel. It is a device that will be appreciated by amateur gardeners in the springtime.

ROWING MACHINE OF SMALL SIZE AND WEIGHT

An exercising device which affords many of the benefits of rowing a boat and is convenient in size and weight for use in the home has been invented by a resident of Marion, Ind. The user's seat slides on a supporting track, while a lever pulled by handles is regulated by an automatic and noiseless friction clutch.



New Rowing Machine That Takes Up Little Space and is Intended for Use in the Home

OPEN-PIT IRON MINING LEAVES LAND TILLABLE

That open-pit mining, even in iron-bearing regions, need not convert the land into a desolate waste but can be so carried on as to leave the soil ready for the farmer, is demonstrated by the operations of an English company. Instead of leaving the earth in irregular barren heaps such as so often mark American open-pit digging, this concern replaced the dirt as fast as the ore was removed, and leveled off the top. The surface dirt was dug out to a depth of about 20 feet by a shovel which rested on the top of the vein. Immediately behind the shovel were workmen removing the ore, while in the bottom of the pit was a conveyor, within reach of the shovel, which received the surface dirt and carried it to the far side of the pit. Both machines moved forward in the same direction on tracks that were laid in front of them as fast as the digging progressed. The replaced earth was smoothed off ready for the planting so that in a short time it again became productive farm land.

ARMY BAYONETS TO LOSE THEIR LUSTER

The comment has often been made that the great European conflict has destroyed all the glamour of war and now it may be added, speaking more literally, that modern war methods are removing all the luster and glitter from war equipment. Just as the gaudy uniforms have given way to those of dull color, so now the luster of bayonets is to be destroyed. The authorities of the United States Army have decided that a company of marching soldiers with shining steel blades on their rifles would be too easy a target for hostile airmen and long-range artillery. Consequently, all bayonets, including those of the militia, are to be "blued" by a special process.

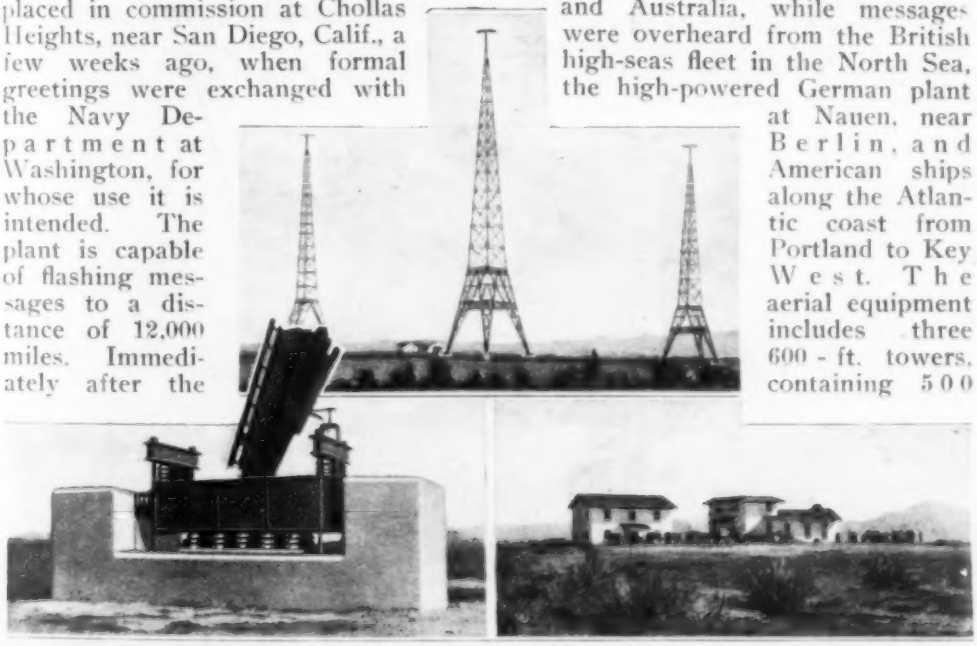
MOTOR CAR TESTED BY A HURDLE JUMP

An unusual test of an automobile was made recently in Grant Park, Chicago, when a skillful driver sent his car full tilt down the speedway at a 14-in. sloping hurdle which caused it to jump a distance of slightly over 36 feet through the air. The feat was repeated three times without apparent injury to the car, which was powered with a 6-cyl. engine and weighed about 2,150 pounds. When the car hit the hurdle it was traveling at a speed of 50 miles an hour and the crash as it landed on the ground after each leap fairly terrified the spectators, who feared serious injury to both the car and its daring driver.

Automobile in Mid-Air, Making a 36-Foot Jump While Traveling 50 Miles an Hour: Both Car and Driver Came Through Safely

POWERFUL RADIO STATION FOR USE OF NAVY

The largest wireless-telegraph station in the western hemisphere was placed in commission at Chollas Heights, near San Diego, Calif., a few weeks ago, when formal greetings were exchanged with the Navy Department at Washington, for whose use it is intended. The plant is capable of flashing messages to a distance of 12,000 miles. Immediately after the opening, the operators talked with points in Alaska, the southern Pacific, and Australia, while messages were overheard from the British high-seas fleet in the North Sea, the high-powered German plant at Nauen, near Berlin, and American ships along the Atlantic coast from Portland to Key West. The aerial equipment includes three 600-ft. towers, containing 500



Top: Distant View of New Naval Radio Plant at San Diego, California, Showing the Huge Towers. Left: Concrete Base of One of the Towers; Insulation Plates of Porcelain Are Visible below the Steel. Right: The Building on the Right Houses the Engine and Generator, While the One on the Left Contains the Transmitting and Receiving Instruments

tons of fabricated steel. They are placed 1,100 ft. apart in the form of a triangle and are triangular in section, 150 ft. at the base and 8 ft. at the apex. Huge porcelain insulators imbedded in concrete form the base of each leg. The aerial wires, or antennæ, weigh 16 tons and sag 100 ft. between the towers; the generator weighs 60 tons, and the tuning coil is 14 ft. in diameter and 11 ft. in height. A government reservation of 72½ acres surrounds the station, with six commodious concrete buildings to house the power plant, operators, commanding officer, and guard.

BIG STURGEON NETS LARGE SUM TO FISHERMEN

That the catching of big fish in Lake Erie is not entirely a thing of the past is proven by the fact that not long ago a crew of fishermen captured a huge sturgeon about a mile from the harbor of Port Bruce, Ont. The fish measured 7 ft. 6 in. and weighed 249 lb. Dressed, the meat sold for 30 cents per pound, or $42 in all, while the 40 lb. of caviar brought the fortunate fishermen $110. Some 20 or 30 years ago, when sturgeons of this size were not uncommon, a catch of this sort would have brought only a small fraction of the sum these men received.

Two Views of a Sturgeon Caught Not Long Ago in Lake Erie, Which Weighed 249 Pounds, Was Seven and One-Half Feet Long, and Sold for $152

MANY OBTAIN SHOES LEFT BY DEPARTING SOLDIERS

Trade in secondhand shoes has been a thriving business in the vicinity of the army camps on the Mexican border since the return of our troops to their homes began. Many of the soldiers, on breaking up of camp, threw away extra pairs of shoes which they did not wish to be burdened with or had no adequate means of carrying. This attracted "shoe pickers" who came in great numbers, some of them in automobiles, and carried away hundreds of pairs of footwear. In many cases the shoes needed half-soling, others needed stitching, while not a few were in excellent condition. These shoes retail for from $1.50 to $2, and consequently the collectors realized neat sums for their pains.

OIL BATH FOR LUMBER HEATED ELECTRICALLY

An unusual use for electrical heating units is found in the equipment of a Chicago concern that employs them to heat oil in a tank in which lumber is treated. The container has a capacity of 100 gal. of oil and is heated by six 4,800-watt immersion heaters placed at the bottom of the reservoir. Any desired temperature can be maintained by means of an automatic temperature control. Heat economy is made possible by reason of an auxiliary tank placed above the main tank so that it absorbs the radiation. The outfit will permit the treatment of 15 timbers simultaneously.

Costly Overhead Lighting System of a New York Moving-Picture Studio: The Stage to be Lighted Below Is 170 Feet Long and 70 Feet Wide. The Groups of Mercury-Vapor Lamps are Moved on the Tracks Seen in the Photograph and Give Results Better than Daylight

OVERHEAD LIGHTING SYSTEM IN MOVIE STUDIO

A lighting system recently installed at an expense of $50,000 in a large moving-picture studio in New York is said to be the most elaborate used in motion photography in the East. It comprises 25 overhead banks, or units, of mercury-vapor lights, each bank weighing 400 lb. They are movable on five tracks, each track having eleven contact spaces indicated by white paint. By shifting the lights a short distance either way, light is obtained for the deepest sets of scenery used in the studio. Contact is made by means of trolley arms. The entire weight of each bank of lights is supported by an overhead steel track, these tracks being 9 ft. apart and 170 ft. long. Each mercury-vapor unit consists of eight tubes, 56 in. long, and the weight being sustained by the hanger rail, there is no tension on the feed wires. The overhead lights are supplemented by a battery of similar units on the floor of the studio, which is also of remarkable size and power, so that when all the lights are in use a sort of superdaylight is produced, with fine results in photography. The actual taking of scenes is all done at night with these lights.

SHOCK AND SOUND ABSORBER FOR TYPEWRITERS

Sixty per cent of the noise made by typewriters can be eliminated, it is claimed, by the use of a device recently placed on the market. This is intended not only to absorb shock and sound, but also to provide an automatic means for attaching and detaching a typewriter to and from a desk. It includes a front and a rear absorber, the former being adjusted by lugs to the side plates of the typewriter, while the latter is furnished with cups in which the rubber feet at the rear of the machine rest. The absorbers then form a resilient bed for the machine, thus taking up the shocks of operation and decreasing the sound made. Provision is made for fastening them to the desk, so that the typewriter is securely held in one spot and "creeping" is prevented.

Shock Absorbers Installed beneath a Typewriter to Lessen Its Noise

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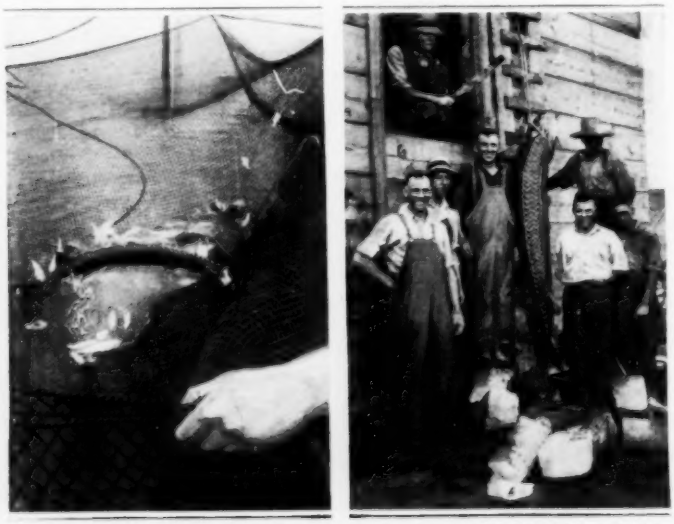

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COMBINATION FERTILIZING AND SPRINKLING DEVICE

A garden-hose attachment now on the market provides a simple means for fertilizing or disinfecting flowers, shrubs, etc., that entirely does away with the task of pumping prepared liquids on plants to be protected or distributing bulky fertilizer by hand. The invention consists of a metal cylinder which attaches to the hose, either just behind the nozzle or next to the faucet. In this container is placed a cartridge composed of the material to be spread on the plants, in highly concentrated form. The flowing water gradually dissolves this compound and it is distributed with the spray. Fertilizer, nicotine insecticide, and other preparations, can be obtained in a form especially adapted for use in this attachment. Plant food can also be obtained in tablets designed to be dissolved in a sprinkling can, thus affording a simple means of fertilizing piazza plants and the like. The tablets can be inserted in the outer end of the spout if it has a screw top.

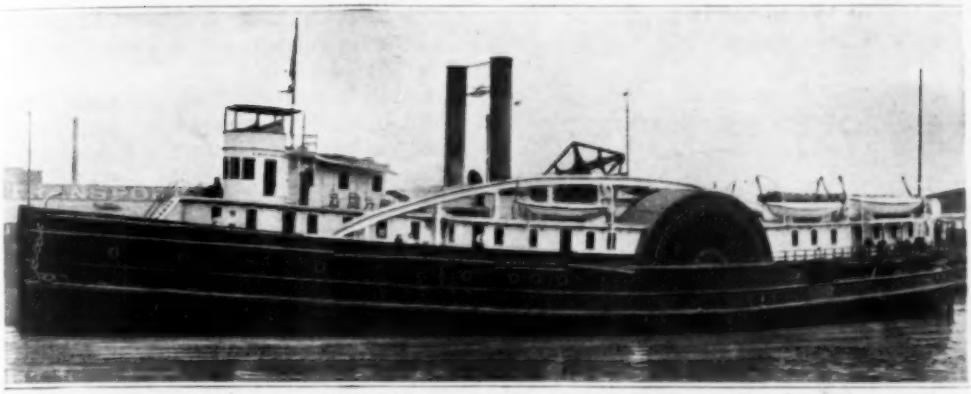
An Attachment for Garden Hose in Which is Inserted a Cartridge of Concentrated Fertilizer or Disinfectant That Slowly Dissolves in the Water. Tablets of Plant Food are Also Prepared for Use in a Sprinkling Can, as Shown in the Inset

DUTCH FIND NEW WAY TO RECOVER FUEL IN ASHES

In seeking ways to overcome the fuel shortage in Holland due to the war, a process has been devised in that country by which the combustible remnants left in furnace refuse can be recovered easily. It is said that this valuable waste often constitutes 20 per cent of the ashes and sometimes as high as 75 per cent. By the new method the refuse is ground up and then put through sieves of four different sizes. Each part is put into a separate basin containing liquid somewhat heavier than water, and the whole is stirred thoroughly. This causes the lighter particles, which are coke and unconsumed coal, to rise to the surface. When they have been scooped out and dried they make excellent fuel, while the heavier particles can be used, it is said, in making a fine grade of concrete. The liquid employed in the separating process is said to be inexpensive and a refuse product of factories.

LAKE STEAMER USED AS A HOTEL FOR WORKMEN

When a shipbuilding concern of Manitowoc, Wis., found that many of its workmen were unable to obtain accommodations in the overcrowded hotels and rooming houses of the city, an old sidewheel passenger steamer was purchased by the company in Chicago and transformed into a hotel for their use. Being run ashore and rebuilt, it now furnishes comfortable sleeping quarters for 110 of the workmen, while hundreds more are daily sheltered, fed, and entertained between its roomy decks in the noon hour. The length of the boat is 205 ft., and its beam 30 ft. It was formerly in passenger service on Lake Michigan and



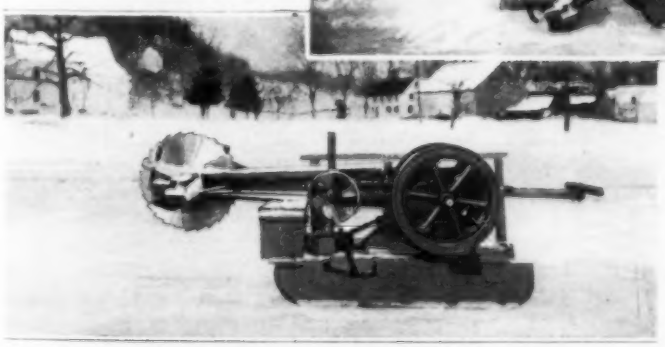
This Veteran Passenger Steamer of Lake Michigan is Now Doing Duty as a Hotel, and Accommodates Hundreds of Employes of a Shipbuilding Concern, as Regular Roomers and Noonday Guests

is well supplied with staterooms for the regular roomers, who have their own dining room on the upper deck, also shower baths, pool tables, and other means of recreation. On the main deck there is a large dining and smoking room for workmen who do not sleep aboard, also a lunch room for those who bring their own dinners. Hot noonday lunches, soup, and coffee may be purchased on board. A special dining room is provided for the foremen and office employes of the company.

ICE-SAWING OUTFIT WITH MOTOR ON A SLED

Harvesting ice is always a man's-size job, but it has become a comparatively easy task for a resident of Waterford, Me., since he designed and built an ice-sawing outfit with a motor-driven saw. On a substantial sled, capable of being pushed by hand, he mounted a light gasoline engine and a circular saw, the latter being carried in front of the sled on a movable arm.

Cutting Ice with the Motor-Driven Saw: The Outfit is Easily Propelled by Hand and Raises a Cloud of Ice-Dust when at Work



With This Circular Saw and Motor Mounted on a Sled a Maine Man and One Helper Cut from 10 to 15 Tons of Ice an Hour

This arm can be raised or lowered without disturbing the tension of a driving belt running from the engine pulley to the shaft of the saw; and the arm is extended at the rear to terminate in a push bar

by which the outfit is propelled. The depth of the cut is regulated by an adjustable gauge.

IMPROVED MAGAZINE FOR MACHINE GUN

A private of a Pennsylvania regiment stationed at El Paso, Tex., has invented a magazine attachment for a ma-

Operating a Machine Gun with New Continuous-Feed Magazine: Above, the Assistant is Seen Feeding Cartridges into the Hopper; Should the Assistant be Wounded, One Man can Operate the Gun, as in the Lower Photograph

chine gun, by the use of which the gun may be fired continuously. At present the cartridges are fed to the gun by an assistant operator, in strip magazines holding 47 cartridges each. With the new device, it is claimed, the delay caused by adjusting new magazines is avoided, and if necessary one operator can both load and fire the gun. The continuous-feed magazine is a steel hopper, 9 in. high, placed above the firing chamber of the gun. Loose cartridges are dumped into this hopper, just as they come from the ammunition cases, and are fed automatically into the firing chamber, the empty shells being ejected as at present.

SPAIN TO ESTABLISH NATIONAL PARKS

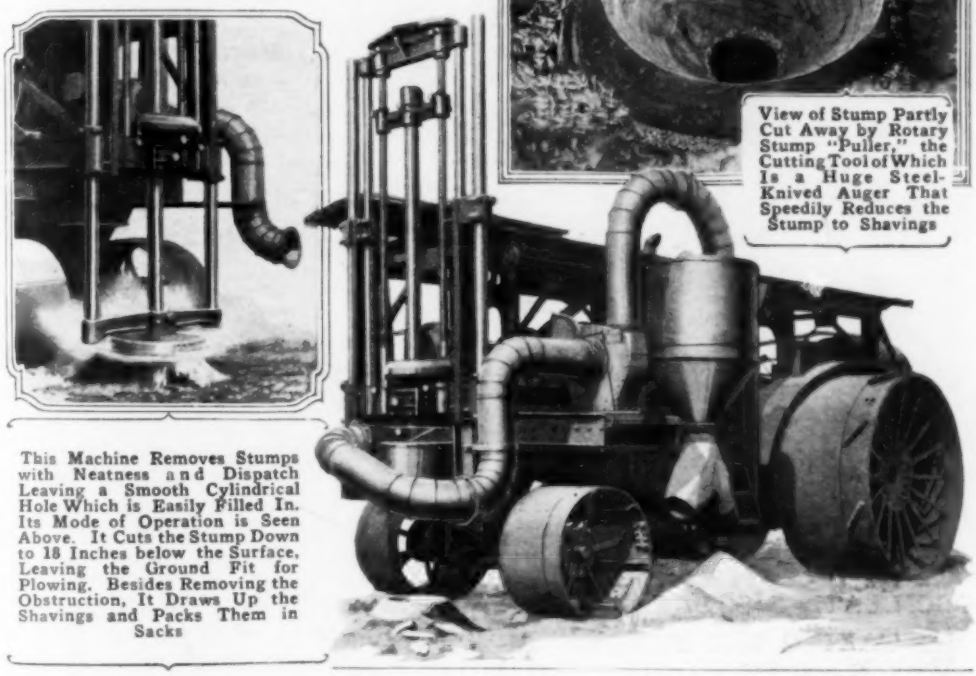
Spain has profited by the example of the United States and has recently enacted a law providing for the creation of national parks. At the time the proposal was under discussion, reference was made officially to the policy of our country in this matter, and the beauties of our national playgrounds were cited. This conservation movement was instituted by the king himself, who was much concerned because of the rapid disappearance of the national fauna, especially in the beautiful Sierra de Gredos. In fact he personally assumed protection of the central portion of that mountainous region, giving it his name and providing for its care. A commission was established which will seek to interest travelers by preserving picturesque and historic spots, and to assist the general public in becoming more familiar with their location and events connected with them.

ROTARY STUMP PULLER SAVES SHAVINGS

When a rotary stump puller recently tested in the South finishes its work upon a refractory stump, there is nothing left but a clean hole and a few sacks of shavings—sacked by the machine automatically while the stump is disappearing. The device is a huge machine which travels and operates under its own kerosene power and grinds the stump to shavings by a powerful steel-knived auger, taking from one to five minutes according to the size of the stump. It cuts down 18 in. below the surface, or 8 in. lower than is considered necessary for plowing, and the hole which it leaves is readily filled with surrounding earth. On the machine used for demonstration on cut-over lands in Louisiana the cutter head is 42 in. in diameter, built into a 40,000-lb. tractor. There are two sets of knives, one set shaving the outside of the stump at an angle of 52 degrees, the other set shaving out the inside at the point of the auger proper as it bores

down the center. The capacity of the machine is rated at two acres a day, or even more. But its chief merit, aside from clearing the land so that it may be sold for farming, lies in the claim that it saves practically every pound of the stump in shredded shavings for the turpentine still and the wood-pulp mill.

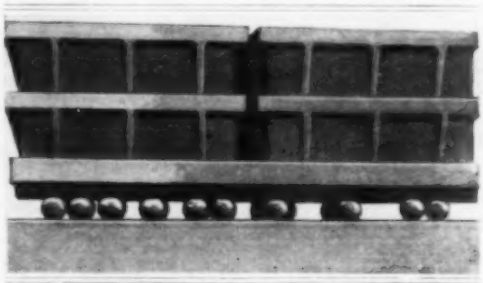
View of Stump Partly Cut Away by Rotary Stump "Puller," the Cutting Tool of Which Is a Huge Steel-Knived Auger That Speedily Reduces the Stump to Shavings



This Machine Removes Stumps with Neatness and Dispatch Leaving a Smooth Cylindrical Hole Which is Easily Filled In. Its Mode of Operation is Seen Above. It Cuts the Stump Down to 18 Inches below the Surface, Leaving the Ground Fit for Plowing. Besides Removing the Obstruction, It Draws Up the Shavings and Packs Them in Sacks

MOVING HEAVY LOADS ON STEEL BALLS

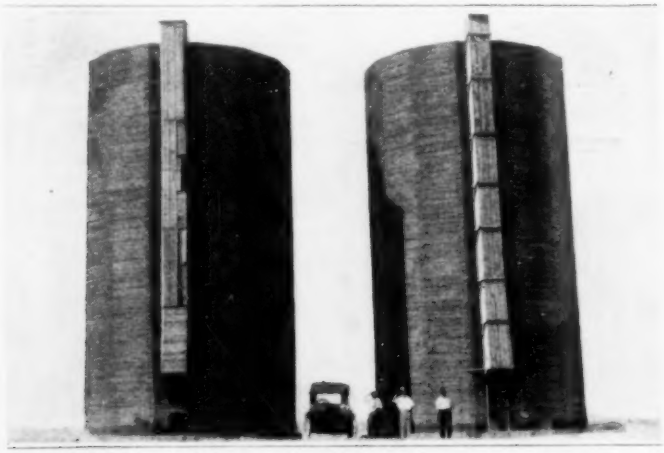
An ingenious method was used in a foundry recently to move two huge cast-iron bins filled with sheet iron to the door of an annealing furnace. The bins when filled weigh several thousand pounds. Two shallow grooves, parallel and about three feet apart, were made in the concrete floor, alined with the furnace door, and connected with similar runways on the floor of the oven. Then each groove was filled with hard steel balls, 6 in. in diameter. A steel plate, 5 ft. wide and 10 ft. long, made with runways to match those on the floor, rests upon the balls. The heavy cast-iron bins are then placed on this platform, and when the material to be heated is deposited in them, the heavy load can be rolled in either direction on the ball bearings with surprisingly little effort on the part of the workmen.



Moving Heavy Cast-Iron Bins Filled with Sheet Iron, by Means of Large Steel Balls Placed beneath Them on the Floor

FOURTEEN-SIDED SILOS MADE OF TWO-BY-FOURS

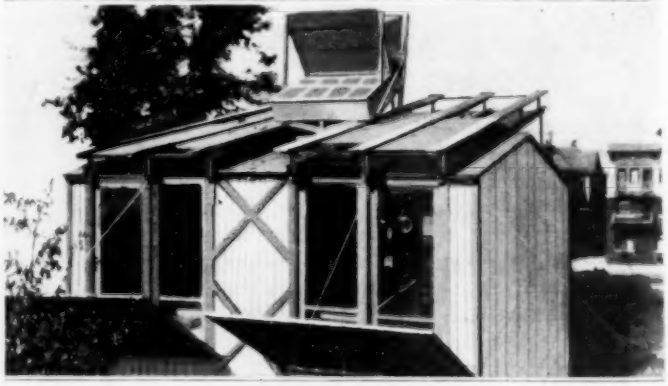
Two silos on a large stock farm near Mayetta, Kan., are of special interest because of their shape and the fact that they are made entirely of 2 by 4-in. beams in the same manner that grain bins are sometimes built, that is, by laying the scantlings on their sides and spiking them together. These big fodder containers are 14-sided, 26 ft. in diameter, and 44 ft. high, and have a combined capacity of over a thousand tons. They are supported by concrete foundations and are so heavy and so substantially built that no guy wires are required to steady them. The lumber, which is dovetailed at the corners, was all cut before the work of building was begun. The structures cost $800 each. They have been standing two years and are pronounced very satisfactory.



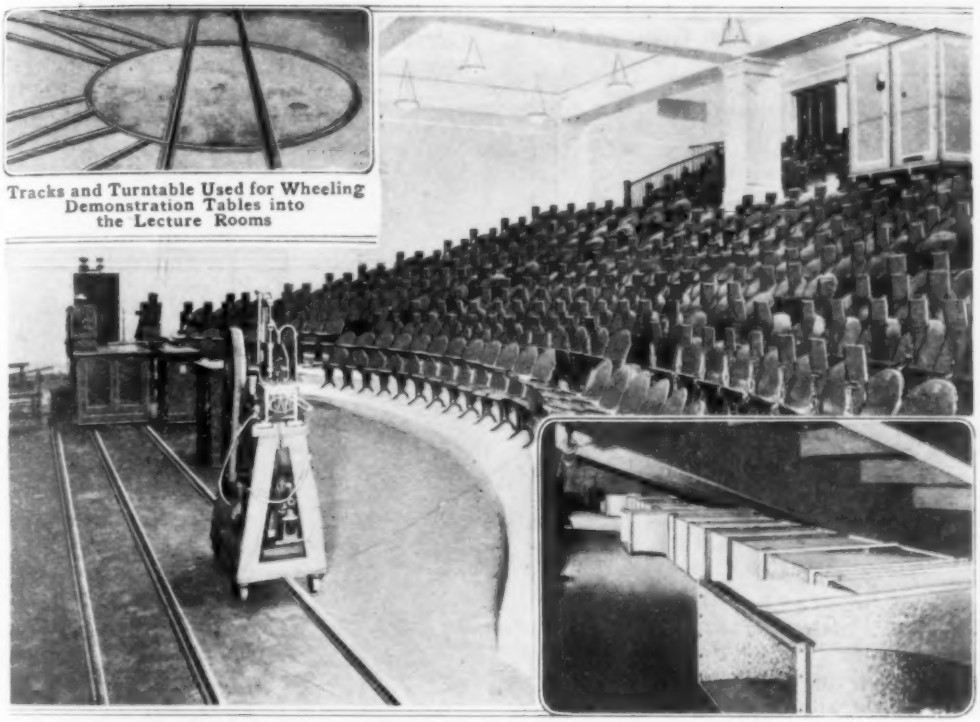
Two Big Silos on a Kansas Farm, Each Having 14 Sides, Made Entirely of Two-by-Fours Laid on Their Sides and Spiked Together. They Have a Combined Capacity of 1,020 Tons

OSCILLATING SOLARIUM FOR TAKING SUN BATHS

An oscillating solarium has been built in southern California in which patients are given sun baths. This novel structure is 16 ft. long, 12 ft. wide, and is mounted on wheels which run on a circular track. By means of a lever it can be made to swing back and forth through an arc of 270° so as to face the sun all day long. The roof and the sunward side are composed chiefly of glass and the interior is divided into two rooms in each of which is a cabinet, 6 ft. long, in which the patients recline directly in the sun's rays. Shades are provided to modify the glare, if desired. After proper exposure the patient is given a shower bath in warm water drawn from a solar heater situated on the roof. This device consists of a glass-covered case containing four tubes, 8 in. in diameter and 4 ft. long. In these water will get so warm that it will steam when drawn off.



Solarium Mounted on a Circular Track so That It can be Made to Face the Sun All Day Long. In It Patients are Given Sun Baths Followed by Shower Baths in Sun-Heated Water



Tracks and Turntable Used for Wheeling Demonstration Tables into the Lecture Rooms

PHOTOS COPYRIGHT, BOSTON PHOTO NEWS CO.

New Lecture Room, Massachusetts Institute of Technology: This Hall Seats 700 Students. At the Left Are Tracks for Bringing In Apparatus. The Insert Shows the Ventilating Chamber

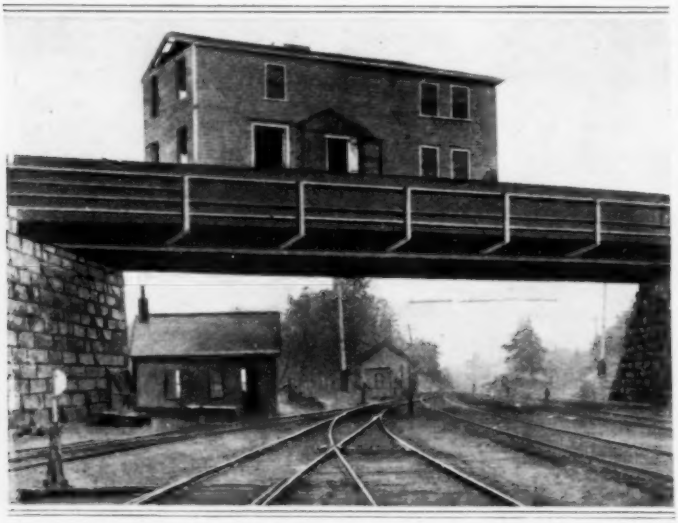
LECTURE ROOM WITH NOVEL CONVENIENCES

A hall for lectures, demonstrations, and meetings of all kinds, recently completed at the Massachusetts Institute of Technology, is supplied with unusual conveniences for both lecturers and students. It is built and finished in concrete and has a seating capacity of 700. The seats are of the folding type, with hat holders beneath them and notebook rests which swing up out of the way when not in use. On the rear wall is a service board which controls electric current, direct and alternating, in different voltages, and illuminating gas, with other supplies, like compressed air; while a water system is at hand for chemical work. A set of rails in the floor in front of the seats is used to bring in and remove table trucks on which apparatus and materials for demonstrations in chemistry, physics, or electricity may follow, one after another, for different classes. The tracks run out into preparation rooms, where the apparatus is made ready for use, and there is a turntable outside the hall by which the trucks may be switched as desired. Ventilation of the hall is effected through a large hermetically sealed chamber beneath the rising tiers of seats, from which fresh air of the right temperature is conducted gently to the classroom through "mushrooms" placed under the seats.

OLD HOUSE MOVED ACROSS BRIDGE OVER RAILWAY

The residents of Middleboro, Mass., recently had the unusual experience of seeing a large old-fashioned dwelling moved across a bridge which spans a railroad right of way in that town. The structure, which was 75 years old, was to be moved to a new site and the only available route was over this

bridge. The house was too wide to be transferred all at one time and so it was cut into three sections, one of which is shown in the accompanying illustration. These sections were moved separately and reassembled at the new site.



One of Three Sections of a 75-Year-Old Dwelling in Middleboro, Massachusetts, being Moved to a New Site

DANCE ANNOUNCER IS USED IN LARGE COUNTRY CLUB

For the convenience of its members and guests, the South Shore Country Club at Chicago has installed an electric annunciating system in connection with the ballroom so that the orchestra leader can flash signals to different parts of the clubhouse as new dance numbers are started. Seven indicators are distributed through the building and connected so that they are operated simultaneously with a push button. Each of these instruments is equipped with an 18-in. dial having the numerals from 1 to 20 distributed about its outer margin. In addition to the push-button switch installed on the music director's stand, there is a small pilot indicator which keeps all of the signaling devices operating in synchronism. Each of the latter is provided with a 20-tooth ratchet wheel controlled by an armature and coil. All of these coils, including the one in the pilot, are connected in multiple, while a second cable carries the lighting current. The indicator hand of each instrument advances one step and the dial becomes illuminated when the operating button is pressed. The advantage of the installation is easily appreciated.

MOTOR BUS HAS OPEN AND CLOSED COMPARTMENTS

A motor bus has been built for year-round use in Los Angeles which has both an open and a closed compartment. The former is at the rear and has seats for eight persons. It is open at

Motor Bus Built for Use in Los Angeles Having Eight Seats in the Open Compartment at the Rear and 10 Seats in the Closed Compartment

the sides only. The closed compartment is reached through double doors from the open division and has seats for 10. There are also seats for three persons beside the driver. The bus has a 25-hp. engine and is capable of 20 miles an hour. Baggage can be carried in racks on the top.

HOUSE BUILT OF QUARTZ RICH IN MINERALS

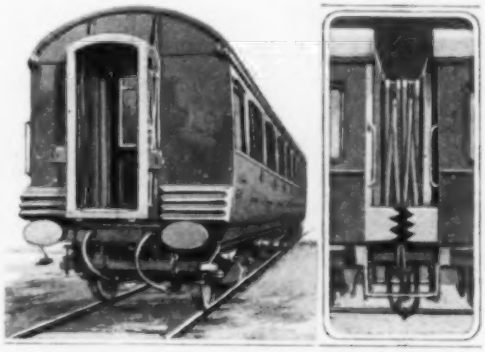
Probably the only house in existence that is built entirely of rich mineral-bearing quartz is situated at a spot known locally as Lovers' Roost, in the neighborhood of Butte, Mont. The rocks used in the structure are all honeycombed on the surface, showing where minerals have been washed out in the course of time, and experts

This House, Modeled after a Swiss Chalet, Contains a Large Quantity of the Precious Metals in the Quartz Rock of Its Walls and Foundation

estimate that there are still present in the rocks gold, silver, copper, zinc, and other metals to a value far more than double that of a similar house of ordinary building material.

ANTICOLLISION BUFFERS AND FENDERS FOR TRAINS

Special buffers and fenders are being used on certain trains on an English railway to reduce the shock of violent collisions and at the same time prevent one car from mounting up over another. Two buffers are placed at each end of a car, having broad, flat iron heads, behind which are heavy coil springs. Each buffer is provided with a supplementary coil spring which is not brought into play until the principal coil has been fully compressed. If the strength of the impact exceeds the combined resistance of the two springs the bolts holding them in place will give way. It is in such an emer-

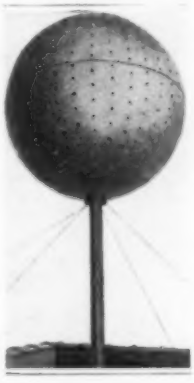


End and Side Views of Corrugated Fenders on English Train, Designed to Keep the Coaches in Alinement in Case of Collision, Thus Preventing Telescoping

gency that the fenders come into play. Each fender consists of a heavy metal guard, the face of which is marked by deep corrugations extending horizontally. One of these is placed above each buffer. When one coach crashes into another these corrugated fenders interlock and tend to keep the cars in alinement.

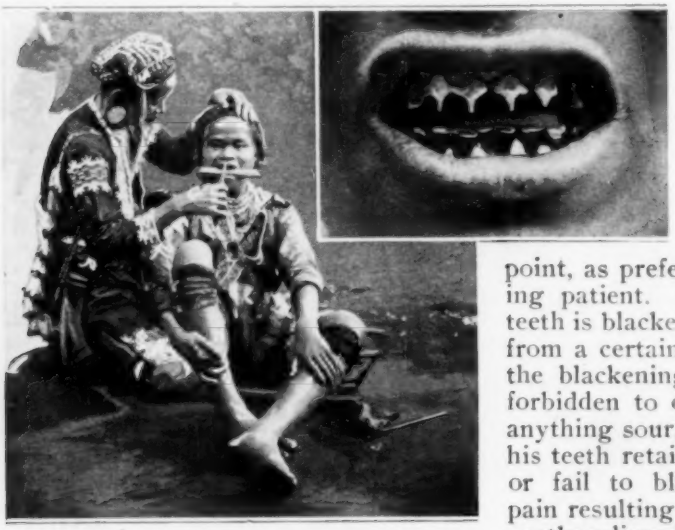
EIGHT-FOOT LIGHTED BALL ON TOLEDO SKYSCRAPER

A huge metal globe, studded with 800 nitrogen lamps, has been erected above a 21-story building in Toledo, and now serves as one of the most conspicuous landmarks in that city night and day. The sphere, 8 ft. in diameter, is mounted on an iron pole, steadied by several wire cables to help it withstand the fiercest gales. Current for the 50-watt lamps which cover it is controlled by a flasher that gives the ball the appearance of revolving on its axis. On a dark, clear night the sphere should be seen some 20 miles away.



TEETH FILED BY FILIPINOS FOR BEAUTY'S SAKE

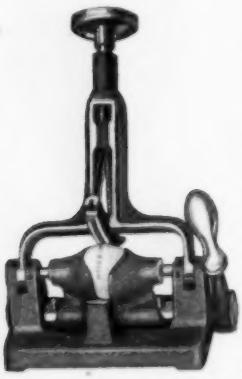
Among the curious customs of the Philippine Islands one of the most peculiar is that of "beautifying" the teeth by filing and blackening them, which prevails among the Bagobos of Mindanao. Both boys and girls of this tribe undergo the filing process before marriage, and this usually occurs while they are still very young. The youth who is to be thus decorated sits on the ground beside the native dentist, gripping between his teeth a stick of wood to keep his mouth open. The dentist then files each tooth down to a stump or else he cuts or breaks each to a point, as preferred by the beauty-seeking patient. All that is left of the teeth is blackened by a powder secured from a certain native tree, and during the blackening process the patient is forbidden to drink water, cook or eat anything sour, or attend a funeral, lest his teeth retain their "ugly" whiteness or fail to blacken beautifully. The pain resulting from such mutilations is partly relieved by the juice of the betel nut, of which the Bagobos are inveterate chewers.



A Young Filipino having His Teeth Filed by a Bagobo Dentist, to Secure the "Beautiful" Effect Seen in the Photograph at the Right. The Patient's Mouth is Held Open by a Stick of Wood

GOLF-BALL MARKER PRINTS OWNER'S FULL NAME

Many players have their golf balls plainly marked with their full name by a little machine which permanently prints the name in waterproof ink without injury to the ball. This effectually prevents disputes as to ownership of balls during a game or when the links are crowded. In using the machine, an inked die bearing the full name of an individual is placed in a slot provided for it, and the ball is locked between cup-shaped holders by means of a lever at the side. The die is then adjusted on the ball by a handwheel, and a forward movement of the arm holding the die prints the name.



SCRAP LEATHER USED IN ENGLAND TO MAKE SOLES

War prices for leather undoubtedly have been a factor in producing, in England, a patented method by which soles can be made from scrap leather. The new bottoms for shoes are described as nonslipping, waterproof, and costing less than the ordinary kind. One type of these soles is provided with rubber strips attached to a thin layer of canvas, and so arranged that the rubber fits in between the leather sections. This feature is said to lend pleasing resiliency to the sole. It is believed that the new process can be employed in heel building also.

The First Mounted-Police Patrol That Went after the Murderers of Radford and Street were Caught in Open Boats While Crossing a Great Northern Lake and were Frozen In by a Sudden Drop of Temperature Peculiar to Northern Canada. They were Forced to Transship Everything Overland, and Even Cut Out the Boats. Here are Seen 13 of a Dog Team Drawing Boats and Contents of 6,000 Pounds

THE WORLD'S LONGEST MAN HUNT

By FRANCIS J. DICKIE

ON June 8, 1912, Harry V. Radford, noted arctic explorer of New York City, and his companion, Charles Street, were speared to death by a little band of Kilinomuit Eskimos in the lonely and desolate arctic region of northern Canada near to the shores of Bathurst Inlet, 60 miles from Point Barrow.

One year later a Chesterfield Inlet Eskimo, named Akulack, brought the story of the white men's murder to the Hudson's Bay Company's post at Chesterfield Inlet. Immediately upon receiving the news from the Eskimo, the factor, H. H. Hall, dispatched a messenger with all haste to the nearest mounted-police post at Nelson River. The story of the incident through which Radford and Street lost their lives is best summed up in his letter as supplied by the official mounted-police report of June 6, 1913. It is as follows:

The Eskimo Talaruck and His Wife, Who Accompanied the Police Patrol. The Endurance and Fortitude of the Eskimo Women Equals That of the Men

"The Eskimo Akulack, who took the Radford party from Shultz Lake to Bathurst Inlet, reported to me on June 5th that both Mr. Radford and Mr. Street were murdered by Bathurst Inlet Eskimos. Cow-Muck, Mr. Ford's Indian trader at Shultz Lake, brought down the news shortly before this, but as I seldom take any stock in Indian yarns, I placed very little confidence in it until I heard the story from Akulack. Both Mr. Ford and myself questioned him twice today, and his version of the story was practically the same as the one given us earlier by Cow-Muck. According to Akulack, he left Messrs. Radford and Street about June 5th last year near the shores of Bathurst Inlet, in company with a small tribe of Kilinomuit Eskimos. Everything seemed to be going fine then, and Radford was about to leave to connect with a whaling ship at Point Barrow. Three days later Radford was about to make a start; in fact the Eskimo, supposed to go ahead, had started when the second Eskimo engaged for the trip backed out. Radford, to force obedience, struck him with the butt of his whip. A fight ensued and Radford was speared in the back. Mr. Street made a run for the sleigh, but by this time the rest of the members of the tribe, some thirty in number, had taken a hand, and he was also quickly speared to death. According to the story, as told to Akulack later by one of the natives, Ne-ve-lie, and by Akulack's father-in-law, Radford put up a game fight and had to be speared several times before he fell; and as life still lingered as he lay on the ground, he got the finishing touch from one of the women, who cut his throat with a seal knife. Akulack states the reason the Eskimo backed out from the trip was that his wife had suddenly taken sick, and he did not wish to leave her just then. Radford, not understanding the Eskimo language, must have taken a wrong meaning and then tried to enforce obedience as above mentioned. Akulack named the principal murderers as Am-me-ker-nic and Hull-la-lark. There is one thing I can say, and that is Radford showed poor judgment when he tried to enforce obedience by striking an Eskimo when he was so outnumbered and far from civilization."

As quickly as boat and train could carry this report from the Nelson River

post to headquarters at Regina, Saskatchewan, it came. And immediately upon its receipt, began preparations for sending a patrol of mounted police to capture and punish the murderers. That they might be anywhere in a vast loneland, thousands of square miles in extent and icebound two-thirds of the year; that the trail was already more than 12 months old, and that not even a good description of the murderers was in their possession—all these things did not stop the mounted police. It is questionable if that phase of the situation was ever even thought of by them.

In the late summer of 1913 Inspector Beyts, Sergeant-Major Cochan, Corporal Conway, and two constables left the headquarters at Regina, to take up a man hunt that was to begin 3,000 miles away in one of the most hostile regions of the world. From Regina they traveled to Halifax, whence the steamer "Village Belle" was to carry them northeast into Hudson Bay.

The expedition was equipped with supplies for two years, and for 18 months the schooner was used as a base. From Halifax the "Village Belle" made a successful voyage until Cape Chitfield was reached. Here a gale was met with that buffeted the boat for many days, carrying away her topmast. But the vessel rode out the storm and at last reached safety in Burwell Harbor on the extreme end of Labrador. From there on to Spearl Harbor, the stout little ship was many times in danger from ice floes and icebergs, barely escaping shipwreck on half a dozen occasions. The landing at Spearl Harbor was made late in September, 1914, too late to proceed farther inland. Here the expedition wintered and met Akulack, whose story has been already told.

As soon as conditions permitted, the party moved on to Chesterfield Inlet, which body of water extends far inland and, by means of several small rivers, permits easy access to an otherwise difficult and desolate interior by way of Baker and Shultz lakes, the territory in which the murderers of Radford and Street were somewhere wandering in that wilderness waste.

From Chesterfield the party pushed inland, in the spring of 1915, to Shultz Lake. Then the wilderness swallowed them up and the world heard no more of them until late in November, when word came out that they hoped soon to overtake the band after traveling over a thousand miles on the strength of the barest of clues furnished by friendly

The Mounted Police Patrol under Inspector Beyts Interviewing Friendly Natives near Shultz Lake as to the Whereabouts of Radford's Murderers in November, 1915

The Canadian Mounted Police: A Unique Photo Showing by the Variety of Costumes How Wide and Varied Is the Country and Weather This Remarkable Body of Men Cover. These Costumes Show Every Form of Uniform Worn from the American Boundary to the Country around the "End of the World," Far within the Arctic Region

Eskimos. Later again came another brief report to Regina, dated Thelon, February, 1916. At the eastern end of Baker Lake they had established a base post of this name. The immensity of the difficulties in this land can be glimpsed even in so brief and formal a thing as a mounted-police report.

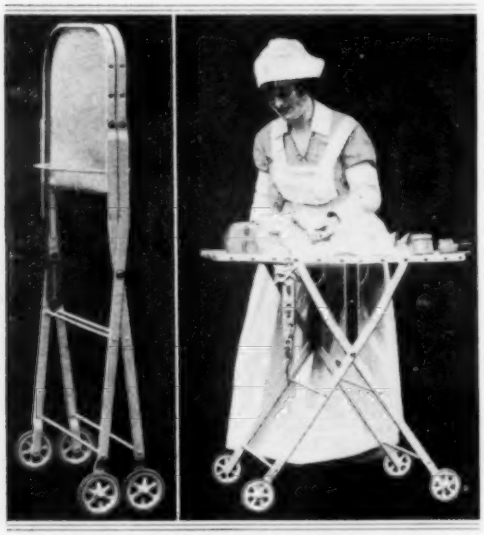
According to this report a gasoline boat had been brought overland and by water to the lower end of Baker Lake. The work took up a great deal of time and it was not until late in the fall they were able to start across the lake in the launch, with three flatboats loaded to the gunwales being towed behind. The ice had already formed around the lake edges, but the outer water was still only thinly filmed, and through this the launch easily broke its way. But halfway across the lake the thermometer had dropped in the amazing manner of the country, and the film ice thickened so the launch could no longer proceed. The four boats were frozen in. Then followed weeks of desperate labor, toting the provisions by dog train, and later the chopping clear and moving of the boats to Thelon.

However, though a diligent search covering all the spring and early summer of 1916 was carried on, success failed to attend their efforts. The murderers were still at large somewhere in that vast land. Certainly no chaser of the will-o'-the-wisp ever had any more difficult job than this sturdy band of mounted policemen.

Late in the summer, their time being up, they began the return trip to civilization; while, even as they moved back toward the land of soft beds and city things, another patrol of equal size under Inspector French was on its way to take their place and continue the search for these primitive lawbreakers. Although the hunt is moving on toward its fourth year, the mounted police still expect to make good their reputation for always "getting their man."

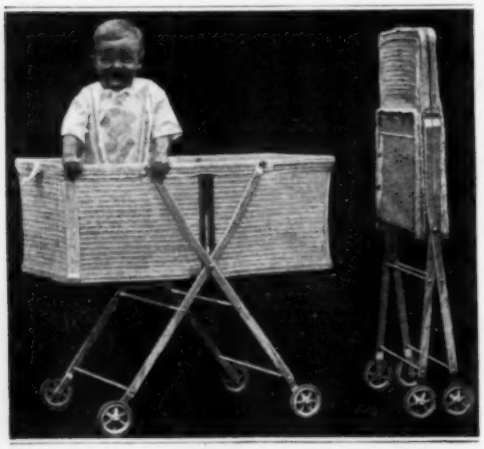
FOLDING WASHABLE CRIB AND NURSERY TABLE

A folding crib, having a body made of washable woven fabric and an enam-



Two Views of a Portable Dressing Table for the Nursery: The Top is Made of Washable Leatherette

eled steel frame mounted on four rubber-tired wheels, is one of the new and attractive pieces of furniture for the nursery. When not in use it can be folded up much like a collapsible go-cart—a feature which renders it most convenient for traveling. An article with a similar frame and wheels is a folding dressing table for a baby. In place of the crib body is a top measuring 19 by 32 in., made of washable leatherette.



Portable Crib Folded and Open: The Woven Fabric of Which the Body is Made can be Removed for Washing

FLOOD-LIGHTING SYSTEM AIDS AIRMEN AT NIGHT

The practice field, for use by the aviation section of the Signal Corps at Hempstead, N. Y., has been provided with 12 powerful flood-light projectors, which mark the area for those members of the section that are taking a course in night flying. The most conspicuous piece of equipment for this lighting system is a searchlight of 1,500,000 cp. which has an effective range of 8,000 yd. This powerful light is employed in "picking up" airmen as they fly over the field looking for a landing place. It also serves as a "lighthouse" for the "mariners of the sky." The great beacon was used for the first time last January.

TO BUILD MOTOR TOLL ROAD IN KANSAS

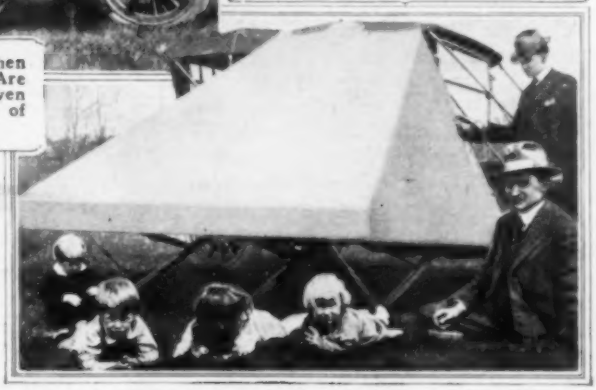
An old post-road act, which has not been taken advantage of for more than a generation, furnished the legal basis for the incorporation recently of a Kansas concern which proposes to build a motor toll road between Fort Scott and Pittsburg, Kan., a distance of some 30 miles. This company intends to maintain a freight and passenger service between the two points and will derive additional revenue by collecting tolls from motorists using the highway. The concern has the same right of eminent domain that a railway has.

AUTO-CAMPING BED OUTFIT FOR A FAMILY

A complete camping outfit for family use, recently patented, can be carried on the running board of an automobile, without interfering with entrance to or exit from the car, as plenty of clearance is left for opening and closing the

How the Full-Size Beds Look When Extended for the Night: They Are Light but Strong and do Not Sag Even under the Weight of This Load of Children and Grown-Ups

The Camping Outfit is Inclosed in a Duffle Bag, Strapped to the Running Board of an Automobile



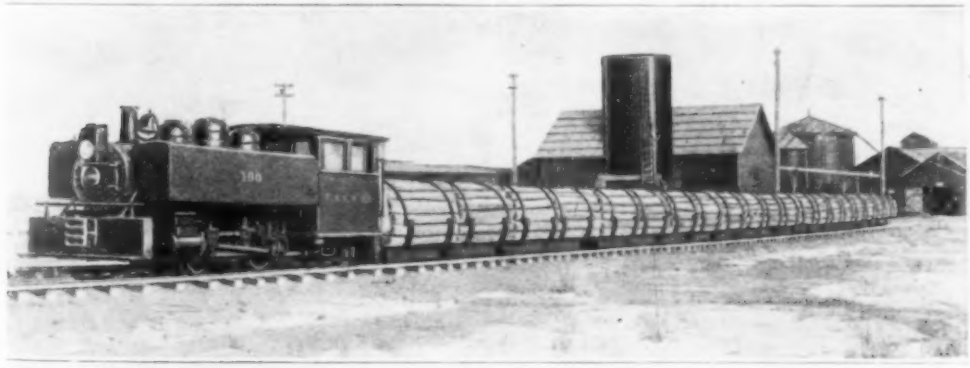
Beds and Two-Room Tent Erected, Showing the Method of Supporting the Tent from the Automobile Top

doors. This outfit includes two full-size beds, each 4 ft. 6 in. wide by 6 ft. 7 in. long, built side by side, and also a two-room tent with side-wall pockets; the whole being packed compactly in a water and dust-proof khaki duffle bag, 54 in. long and only 6 in. high. The bag is made of sufficient size to permit the adding of a sufficient quantity of blankets and other bedding to meet all usual requirements. When camping for the night, the tent and beds are erected at one side of the car, the tent being supported by the car top and the beds forming a floor for the two sleeping "rooms."

¶A company has installed four flying boats at Palm Beach, Fla., to be used for fishing trips.

TRAIN AND LOAD IMMERSED IN TIE-TREATING FLUID

A strange-looking train, composed of a narrow-gauge oil-burning engine and a number of very low flat cars of corresponding width, constitutes an interesting part of the equipment of a tie-treating plant recently opened at Riverton, Wyo., by the Chicago and Northwestern Railway. A string of these cars, loaded with about 500 ties, is backed into a strongly built steel cyl-



COURTESY OF ENGINEERING NEWS

The Cars of This Novel Train are Loaded with Ties and are Designed Especially to be Backed into a Long Cylinder, in Which They and Their Load are Immersed in a Solution That Prolongs the Life of the Timbers

inder, 132 ft. long. The engine is then detached, the big circular door at the end of the retort is tightly closed, and a zinc-chloride solution is forced into the chamber by a vacuum process. When the ties are completely immersed in the preserving liquid it is put under pressure to force it into the wood fiber. After six hours they are thoroughly saturated and are removed.

PIPE ORGAN IN HIGH-SCHOOL AUDITORIUM

A pipe organ having 1,100 pipes is one of the features in the high-school

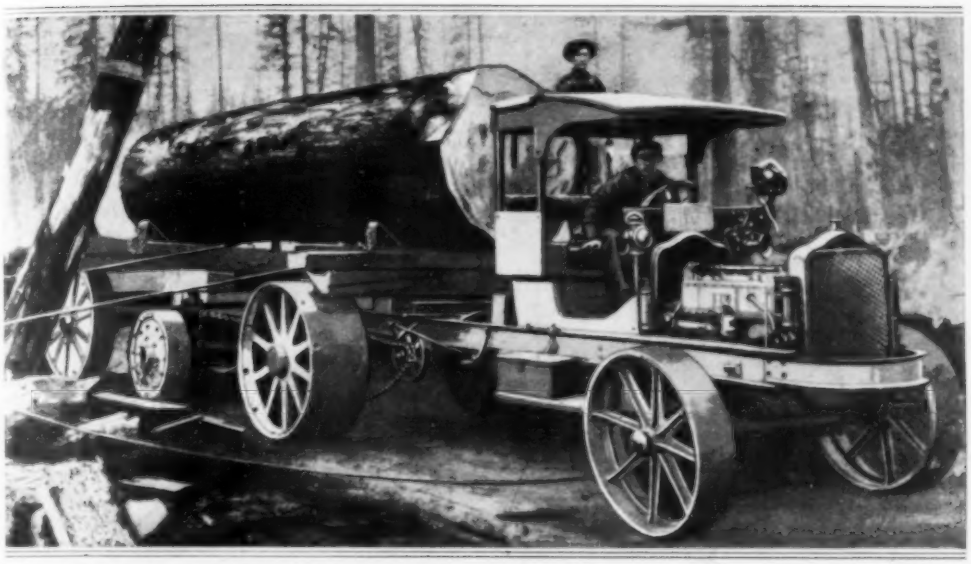
Stage of Los Angeles High-School Auditorium with a Glimpse of the Organ Pipes above the Stage and the Console in Front of It

auditorium in Van Nuys, a suburb of Los Angeles. The manufacture of pipe organs is an important industry in this community, and it was natural that the local board of education should take pride in equipping the school with a fine instrument. The visible pipes are arranged above the stage and the console is situated on the main floor in front of the platform. This is one of the few public schools in the country provided with a pipe organ. Both in connection with school theatricals and with the general assembly of the pupils the organ proves a valuable addition.

STORE ENTRANCE REPLACED BY SHOW WINDOW AT NIGHT

One of the large window displays of a department store in Chicago, which is brilliantly lighted at night, disappears every morning as the hour approaches for opening the store, and a vestibuled entrance appears in its place. The show window is in reality an elevator cage, which is lowered each morning to the subbasement and raised again to the street level as soon as the store closes in the evening. As it rises it carries up with it the floor of the vestibule used by customers entering the store during the day. An adaptation of the same idea has been used in the East for some time.

At the Right, a Chicago Window Display as It Appears at Night When the Store is Closed. At the Left, the Vestibuled Entrance in the Space Occupied during the Night by the Disappearing Show Window. Note the Floor, Which Rises with the Ascending Window Display in the Evening



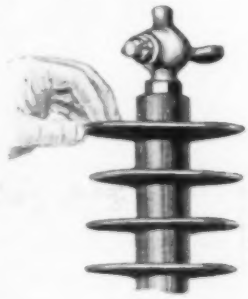
Wide-Tired Truck, with Trailer, Which Makes a Smooth, Hard Track as It Goes. The Outfit is Equipped with a Winch Which is Used in Loading the Logs and in Emergencies en Route

WIDE-TIRED TRUCKS MAKE OWN LOGGING ROADS

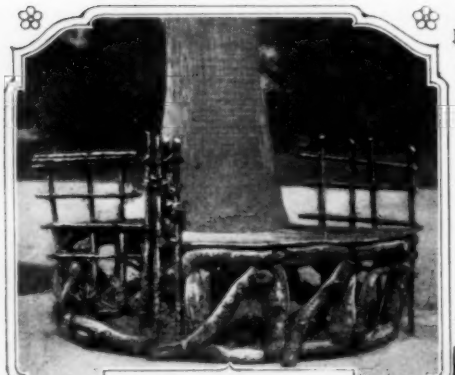
Powerful wide-tired trucks are now being used in logging regions in Oregon and Washington, which virtually make their own roads as they go. One type of these cars has front tires 10 in. wide, and back tires, 20 in. wide. An experienced driver carefully selects his course as he goes over a route for the first time and the weight of his machine makes a road as it moves along. A few trips over the same line of travel serve to make a hard, smooth surface which will withstand considerable bad weather. Four-wheeled trailers are often used with these trucks, as shown in the accompanying illustration. Two-wheeled trailers are also used. Many of the machines are equipped with a winch and cable by which the logs are drawn up to the loading place and thence onto the truck. This outfit is also employed occasionally to pull the truck out of a mire. The big cars travel from six to eight miles an hour and draw as heavy a load as six or eight horses. The saving of time is an item of prime importance, especially where the hauls are long as is often the case in the western forests.

CONDITION OF STEAM TRAP INDICATED BY GAUGE

To help a stationary engineer determine quickly and certainly whether a steam trap is operating properly, a simple thermo gauge has been devised. Such a trap, it will be understood, is an appliance that permits the passage of water of condensation out of pipes, engine cylinders, radiators, and the like, without allowing steam to escape. The gauge is tubular in form, made of brass, supplied with a series of flanges, and fitted at the top with a "try" cock. When the trap to which it is applied is working as it should, the radiator disks about the gauge are fairly cool. In case the former is leaking, however, steam coming in contact with the gauge causes the flanges to become extremely hot. Thus by placing a finger on one of the radiators an engineer learns whether a trap valve is tight or leaking.



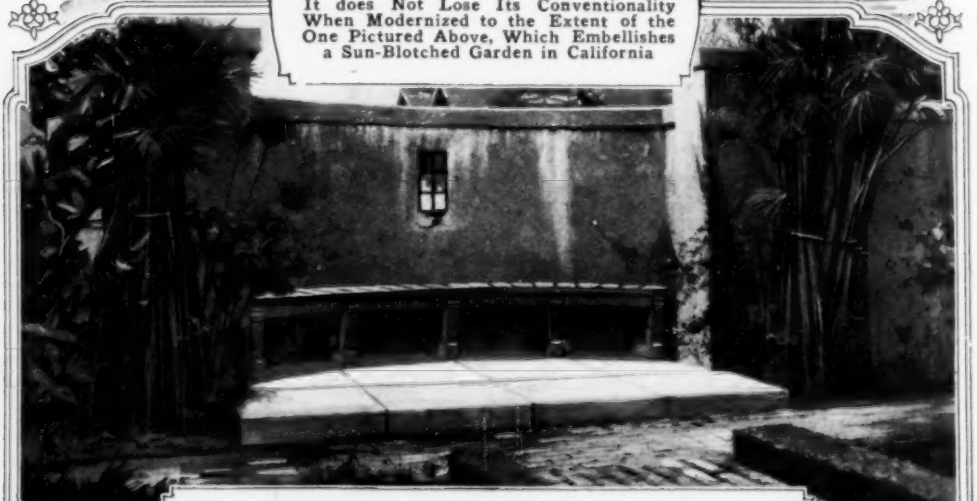
GARDEN BENCHES IN SHADED RETREATS



Just a Place to Pause for a Moment When the Sun Is Hot, or the Moon Shimmering: A Rustic Seat Built of Gnarled Branches and Bamboo Sticks around a Big, Friendly Palm

Here Is a Bench That is Easily Constructed When Timber Is Available, but Also One That Usually Seems Out of Place Unless There Are Trees and Bushes Near at Hand. It Really Requires a Woodland Background

When in Its Proper Element amid Complementary Surroundings, the Classic Exedra Is Impressive, Interestingly, Too, It does Not Lose Its Conventionality When Modernized to the Extent of the One Pictured Above, Which Embellishes a Sun-Blotched Garden in California



When a Long, Solid Bench is Placed in an Alcove of a Garden Wall, an Atmosphere of Cloistered Privacy is Created; and if Palms, Vines, and a Rough Brick, or Flagstone, Walk Also Enter into the Setting, a Tinge of Romance Is Added. The Final Touch Developing the Latter Element in the Picture Above is Contributed by the Peephole That Gives a Glimpse Beyond

WHERE REST AND QUIET MAY BE FOUND

Not in Many Gardens does One Find a Place of Rest That Is so Pastoral in Its Suggestion as the One Sketched Above. It is Built of Rough Stones about an Inclined Tree and is Adorned with Ferns

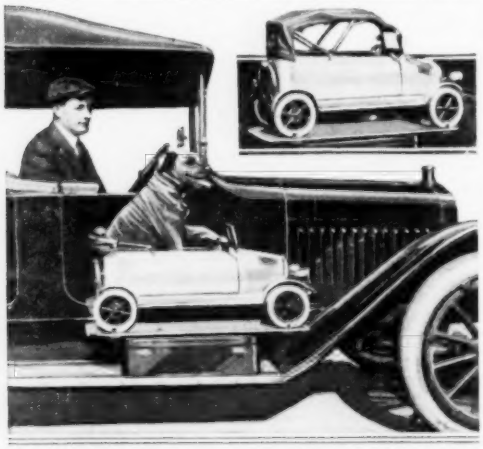
Climbing Roses Cling to the Heavy Bowlders and Entwine the Trelliswork of This Pergola, beneath Which, Back to Back, Are Two Benches. This Type of Outdoor Architecture Is Particularly Popular on the Pacific Coast

These Big Cement and Bowlder Benches Border a Cinder Track on the Campus of the Boulder, Colorado, High School, and were Built by Members of the Student Body. Each of the Seats Is 19 Feet in Length and of Lasting Construction

The Trees, Shrubbery, and Vines, Contribute Much to the Beauty of This Wall, with Its Friendly Seat and Picturesque Gate, and Give It the Appearance of Simplicity and Wholesomeness Which is Always Admired. A Garden Wall Reflects Art and Taste, or the Lack of Them, Just as Intensely as Do the Interior Decorations of a Home

TINY CAR IS DOG'S SEAT ON AUTO RUNNING BOARD

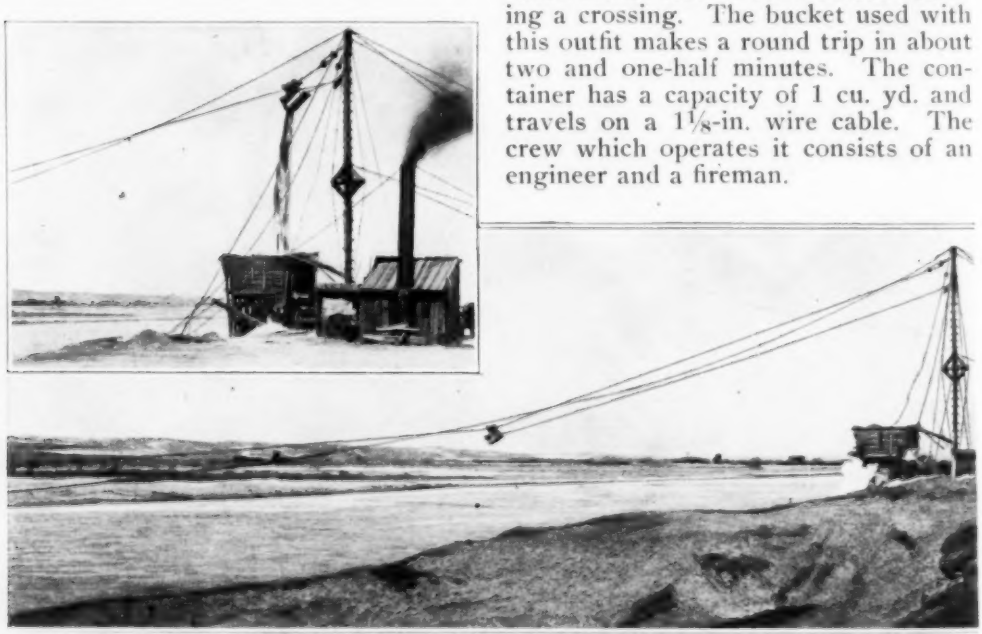
A most unusual and elaborate seat for carrying a dog on the running board of an automobile has been constructed with much ingenuity by a motorist in Los Angeles. It consists of a miniature car reproducing, in almost every detail, the large motor car on the running board of which it is fastened. It is equipped with an engine having a fan, starter, spark plugs, cylinders, etc. Many of these parts were constructed from old clockworks. The engine is driven by power from dry cells located in the big car, and through the isinglass window in the tiny hood one can watch the engine running. Other parts which have been provided are a differential gear, a movable steering wheel, a spot light, clock, tail light, and windshield.



An Unusual Seat for a Motorist's Dog, Being a Miniature Reproduction of the Larger Car on Which It is Mounted

AERIAL CABLE SAVES LONG HAUL FROM GRAVEL BED

An example of a profitable aerial tramway is to be found in the equipment installed by a contracting company in Casper, Wyo., to transport gravel from the north bank of the North River to the opposite side. If the material were transported by wagon instead of by cable it would have to be hauled along the farther shore for at least a mile before reaching a crossing. The bucket used with this outfit makes a round trip in about two and one-half minutes. The container has a capacity of 1 cu. yd. and travels on a 1⅛-in. wire cable. The crew which operates it consists of an engineer and a fireman.



Aerial Tramway That Transports Gravel across the North River in Wyoming, Thereby Saving a Two-Mile Haul with Wagons. The Bucket, Shown Above Discharging Its Contents into the Hopper, Makes the Round Trip in About Two and One-Half Minutes

When the Stars and Stripes Float below the Dutch Flag at the Commercial Club, Yankee Travelers Know That a Boat from Home has Docked at the Wharves

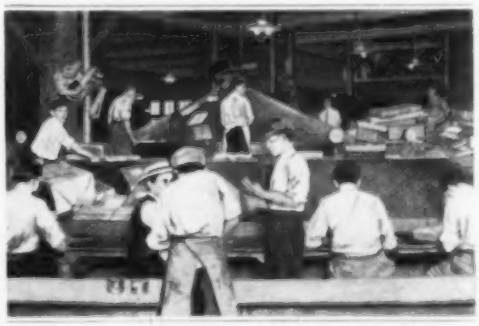
PARAMARIBO'S HOSPITALITY EXTENDED AT CLUB

Practically every one of any standing who arrives at Paramaribo, the capital of Dutch Guiana, is received at the Commercial Club and shown genuine hospitality. The institution is what its name implies, and more; it is the port's smartest resort. A large ballroom permits rather fashionable dances to be held twice weekly, while in other rooms globe trotters and international commercial representatives may meet, escape the heat of the afternoon sun, read the latest telegrams as they are posted, scan the New York market quotations, and practice with the cue. Architecturally the building, with its shuttered openings on all sides, is characteristic of the tropics, while its setting back of a well-trimmed hedge in the midst of a grove of palms is most inviting. It is constructed entirely of colonial hard woods.

¶A naval officer, whose position enables him to know, has predicted that improvements now being made in radio direction finders will soon permit operators accurately to locate the position of a vessel sending a wireless message.

REVOLVING CONE AIDS IN SORTING PACKAGES

Great facility in sorting addressed packages is obtained by means of revolving cones, two of which have been installed by an express company, one in New York and one in San Francisco. Bundles collected by the express drivers are delivered by a belt conveyor to the apex of this revolving distributor. As they fall upon its smooth sloping surface they quickly slip to its outer edge, whence each is transferred by one of a group of distributing clerks to the proper waybill and weighing employe, occupying one of the desks that encircle the device.



Revolving Cone Which Enables Express Clerks Rapidly to Distribute the Addressed Packages Dropped upon It, to the Proper Waybill Employes Seated at the Encircling Line of Desks

FISH BOWL ACTS AS LENS AND SETS BED AFIRE

The fact that a goldfish bowl in a St. Louis home recently acted as a sunglass and started a fire has given

A Goldfish Bowl so Placed in the Window of a St. Louis Home That It Acted as a Sunglass and Set the Bed Afire

rise to considerable discussion in that city concerning the advisability of restricting the use of spherical aquariums. The transparent vessel was filled with water and stood in front of a window in the direct rays of the sun, which were concentrated to a single point by the bowl. As the sun moved along its course this focal point fell upon the pillow of a bed, which stood near by, and set it afire. Fortunately the blaze was discovered before serious damage was done. The accident is not an unusual one.

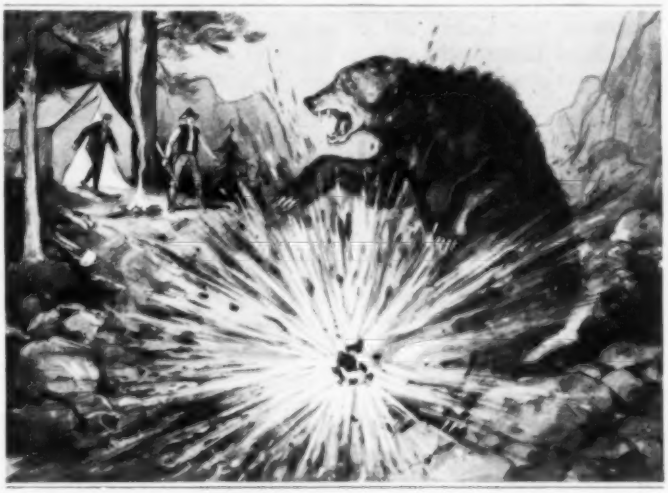
FARMERS TILL RAILROAD'S RIGHT OF WAY

A very practical conservation movement has been undertaken by the Chicago, Burlington and Quincy Railroad by inducing farmers along its right of way to cultivate the railroad's land adjoining their farms. Over 600 country dwellers took advantage of this plan last year, paying the nominal fee of $5, which entitles them to utilize the land adjoining theirs for an indefinite period. This soil, which is usually very rich because so long untilled, is planted to alfalfa and the yield has been as high as eight tons to the acre. The average amount of land which each man cultivates is three acres. The arrangement lessens the weed menace for the near-by fields and, since alfalfa remains green a long time, it lessens the danger of prairie fires. At the same time the road is saved the cost of mowing the right of way.

Utilizing the Railroad's Land: A View of a Newly Mown Alfalfa Crop Which Illustrates What Several Hundred Farmers, Whose Land Adjoins the Burlington Railroad's Right of Way, have Done under That Road's Direction

BEAR THAT KILLED A MAN BLOWN TO PIECES

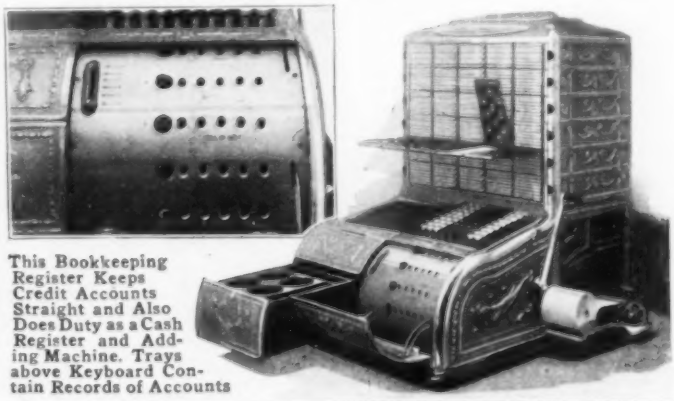
A bear that had severely mauled a government teamster in Yellowstone National Park was blown to pieces by dynamite recently, while the teamster died from his injuries in the Military Hospital at Mammoth Hot Springs. The man was asleep under a supply wagon in the park when he was attacked by the bear. Two companions drove the animal away, after serious injuries had been inflicted on their mate, and when the latter had been removed to the hospital they prepared a warm reception for the bear, knowing it would return. Dynamite, connected with a small electric battery, was placed under a bait of army bacon a short distance from camp. When the bear came back under cover of darkness and nosed the bait, the mine was sprung and the dynamite did its work most effectively. Bruin disappeared in sections, and the unlucky teamster was avenged.



When a Bear Fatally Mauled a Teamster in Yellowstone Park, His Companions Set a Trap with Dynamite and Blew the Bear to Pieces

AUTOMATIC BOOKKEEPING BY CASH REGISTER

A business appliance lately placed on the market in Kansas City, Mo., combines the functions of a credit register, an adding machine, and a cash register. It was designed for the use of retail merchants, but can be adapted to any business in which credit is extended. The keyboard comprises means for recording credit sales, cash sales, receipts and payments of money, invoices, and additional details of the day's business. Above the keyboard is a credit division, containing numerous trays with records of customers' accounts. These trays, as well as the cash drawer, are locked, making it necessary for a clerk to identify himself by depressing his allotted initial, or number, key, before he can gain access to either. A permanent printed record of each transaction is made by the machine, as the appropriate keys are depressed. In case of a credit sale, the original sales

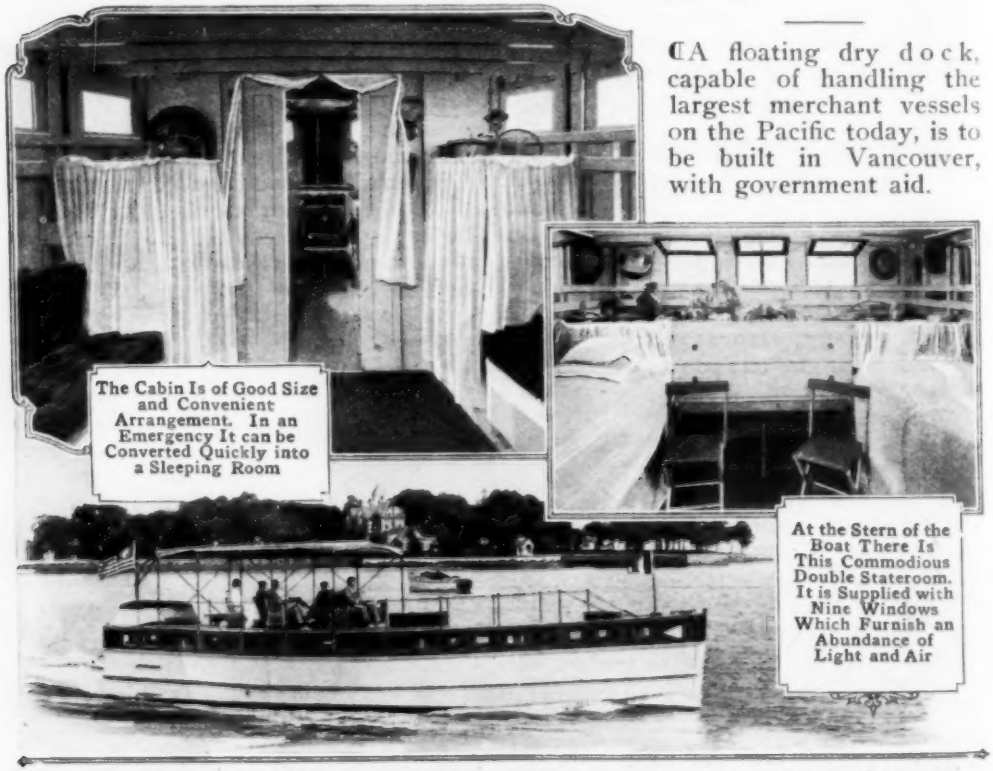


This Bookkeeping Register Keeps Credit Accounts Straight and Also Does Duty as a Cash Register and Adding Machine. Trays above Keyboard Contain Records of Accounts

ticket, including the amount of previous purchases brought forward, is filed in the credit tray containing the customer's account. Each of the removable sections holds 25 credit accounts. At the close of the day the machine records the totals for all the various kinds of transactions.

SPEED HOUSE BOAT IS BUILT ON HYDROPLANE LINES

Radical departure from conventional designing is found in a new 50-ft. speed house boat that was launched in the East before the close of the past season. The craft throughout is of very light construction and interesting arrangement, and has splendid accommodations. One of the surprising things about it is that it is built upon the expanded lines of a hydroplane. With a 12-ft. beam it carries enough freeboard to give a 6-ft. 3-in. clearance, and has a regular ship's deck, which is roomy and comfortable. In all, the vessel has 45 separate windows which provide abundant light and ventilation below deck. A four-cylinder, 80-hp. engine drives a single propeller, and under way the vessel has a draft of only 27 in. The accommodations comprise a galley, cabin, three single staterooms, a toilet, and a large double stateroom at the stern. The galley is equipped with a four-burner alcohol range and a table 6 ft. 3 in. long, with shelves fitted beneath. In case of necessity this can be converted into a bunk. A large sink and refrigerator, the latter built so that it can be readily moved, are provided on the port side. Provisions and ice can be lowered through a hatch that also enables members of the crew to reach the galley without passing through the cabin. The craft has received much favorable comment from some of the enthusiasts who have seen it.



The Cabin Is of Good Size and Convenient Arrangement. In an Emergency It can be Converted Quickly into a Sleeping Room

At the Stern of the Boat There Is This Commodious Double Stateroom. It is Supplied with Nine Windows Which Furnish an Abundance of Light and Air

The House Boat Has Surprising Accommodations and Embodies Refinements in Design and Construction Which Make for Speed. Throughout, It Is Unusual and Interesting

¶A floating dry dock, capable of handling the largest merchant vessels on the Pacific today, is to be built in Vancouver, with government aid.

WORLD'S GREATEST TELESCOPE AT MOUNT WILSON

WORK on the 100-in. reflecting telescope at the Mount Wilson observatory, Pasadena, Calif., is approaching the final stage, and within a few months, possibly by July, will be completed. During the 10 years spent in designing and constructing it, much technical interest and popular misunderstanding have arisen. The instrument will be the largest stellar camera in existence and will collect twice as much light as any other telescope. From a scientific viewpoint it is an experiment in certain respects. But for the measurement of the heat radiation of stars and the spectroscopic study of the faintest objects it will yield results commensurate with its size, according to George Ellery Hale, director of the observatory. The instrument, contrary to the impression held by some, is not designed to settle the question regarding the canals of Mars. There is reason for hoping, however, that it will extend the visual boundaries of the universe by making possible the photographing of many millions of stars existing beyond the range of the most powerful telescopes in present use.

Primarily the new instrument will be employed in continuing astronomical investigations that have been undertaken with the 60-in. reflector at Mount Wilson. To be accomplished are the extension of studies now in progress on the structure of the universe and the evolution of the stars. The nature of nebulæ and star clusters, the distances of stars and their motions in streams, the question whether light is scattered in its passage through space, and the matter of the dependency of a star's redness upon its physical condition, are, with innumerable other things, subjects which the power of the new reflector may help to determine and clarify.

Although its moving parts weigh about 100 tons, the big telescope is far more delicate than any watch ever made. Every part of its mechanism is as nearly perfect as human skill will permit. The reflector, which is 101 in. in diameter, 13 in. thick, and 4½ tons in weight, has been ground from a block of glass cast at St. Gobain, France, in 1906. The disk was produced following several failures and accepted after being given a spherical surface and tested under various conditions of temperature and in different positions to determine the constancy of its surface. Subsequently the final grinding of the disk to a parabolic surface was undertaken and completed by the expert in charge of optics at Mount Wilson observatory. This work, requiring minute precision, made necessary the development of special grinding and polishing machinery and the originating of special processes. In addition to this major reflector, the telescope will be supplied with four smaller auxiliary mirrors.

The tube is about 12 ft. in diameter and 45 ft. long. This and other parts of the telescope's mounting and operating mechanism is being set up within a housing that is 100 ft. in diameter and 100 ft. high, the upper half of it being a dome. The latter is rotated by an electric motor on rails which have been ground so true that motion along them is smooth and perfect. This was imperative in order to avoid the possibility of vibrations being set up within a large fixed spectroscope occasionally to be employed with the telescope. The heavier parts of the instrument's mounting were built at an eastern shipyard, but all of the smaller parts, requiring great accuracy in fitting, were constructed in the instrument shop of the observatory by its own experts.

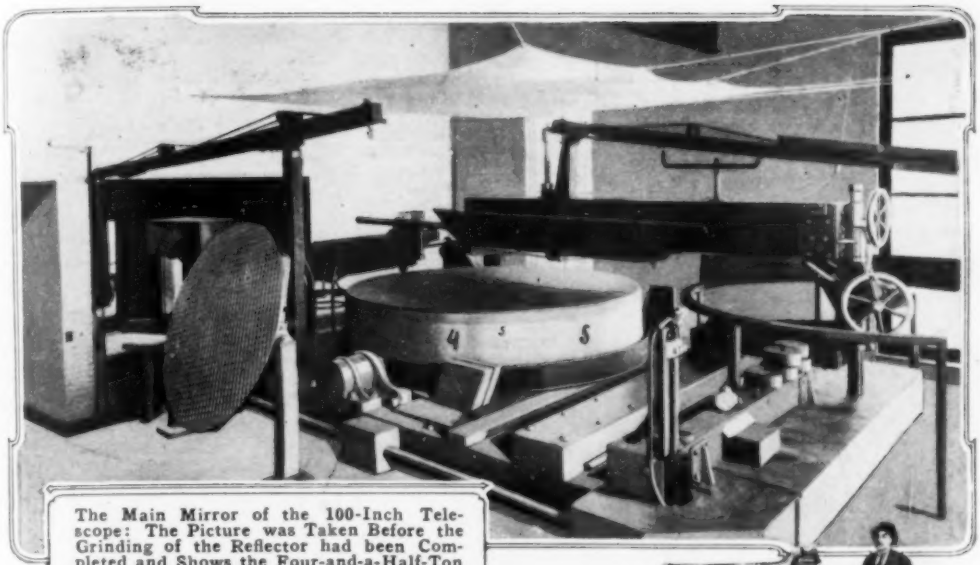
The dome and building housing the instrument are constructed so that no air can enter when the shutter opening is closed. This precaution and the use of refrigeration machinery are necessary to prevent changes in the shape of the mirror through temperature variations. The mirror is held in a steel housing which is insulated with felt and cork.

Dome Erected at Summit of Mount Wilson to House the World's Greatest Telescope, the 100-Inch Reflector That is Now Nearing Completion after Ten Years of Unceasing Work. The Dome, Strictly Speaking, Is Only the Upper Half of the Structure and Revolves on a Track That has been Ground True to Insure Smooth Motion

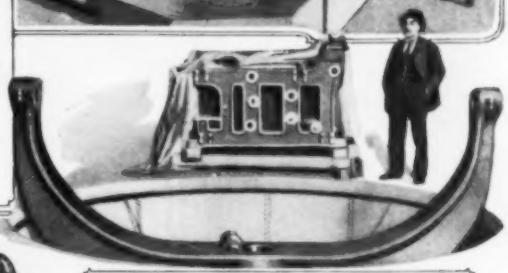
This Gives a Close View of the Base of the Tube Loaded on the Truck. When Almost at the Top of the Mountain, the Great Weight of the Machine and Its Burden Caused the Outer Edge of the Road to Crumble at a Curve. One Wheel Slipped over the Brink of a Precipice and the Truck Tilted to a Dangerous Degree, but did Not Tip Over. Had the Machine Rolled down the Mountain It would have Taken Many Months to Replace the Loss

Carrying the Massive Base of the Telescope Tube up the Steep, Hazardous Road That Winds for Nine Miles up Mount Wilson to the Summit, Overlooking Pasadena. This Section of the Steelwork Weighs 15,000 Pounds and, Like Certain Other Parts of the Instrument, Proved a Difficult Thing to Handle. It was Built at an Eastern Shipyard and Transported to California by Water. It was Then Placed on a Motor Truck and Hauled up a Road That Has a Grade Ranging from 10 to 18 Per Cent

Here Is a Picture That Not Only Illustrates a Remarkable Motor-Truck Performance but Also Explains Some of the Difficulties Encountered in Carting the Telescope's Parts to the Mountain Top: It Shows a 10-Ton Girder being Carried around One of the Many Sharp Turns in the Steep Road Scaling Mount Wilson



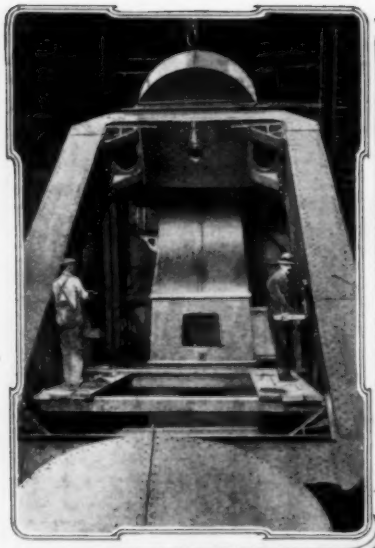
The Main Mirror of the 100-Inch Telescope: The Picture was Taken Before the Grinding of the Reflector had been Completed and Shows the Four-and-a-Half-Ton Cylinder of Glass on the Rotary Grinding Table in the Shops at Pasadena, Where the Work was Done by the Expert in Charge of Optics at the Mount Wilson Observatory. The Honeycomb Plate Seen at the Left Is the Grinding Disk, Which, When in Use, was Held by the Big Arm That Extends over the Mirror



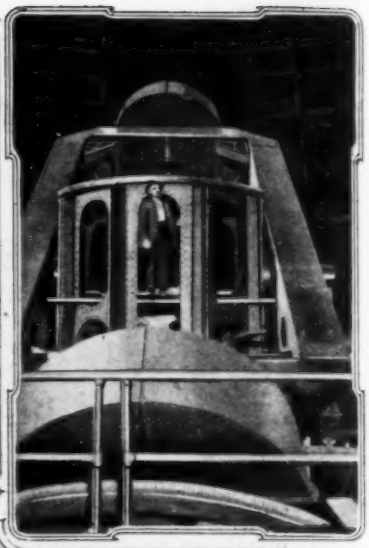
Elevator Installed beneath Telescope to Facilitate Removal of Reflector to Laboratory Below, Where the Periodical Resilvering of Its Surface will be Accomplished. Before Removal from the Instrument, the Mirror's Housing is Bolted to the Elevator's Upturned Arms

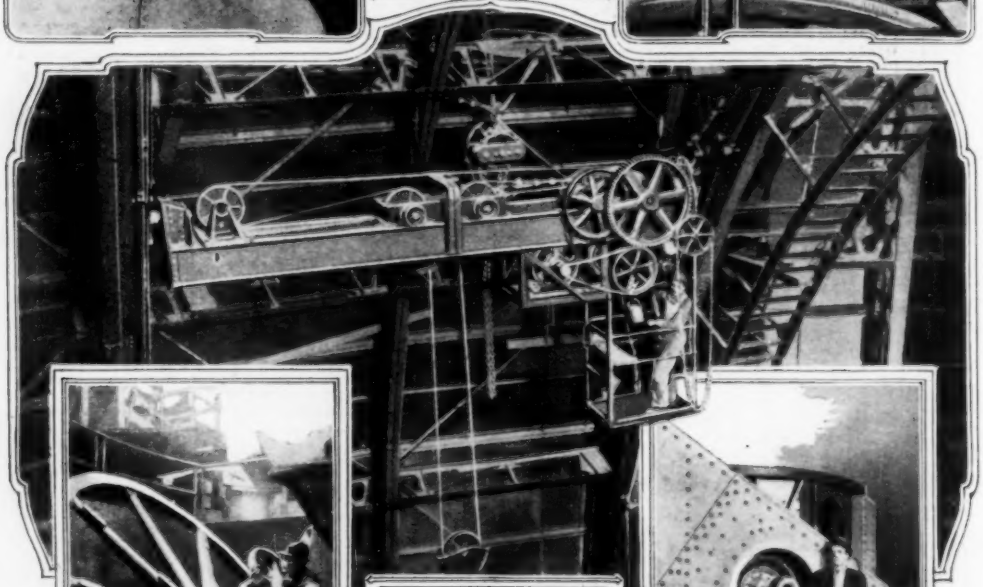
Felt and Cork Insulate the Steel Housing of the Reflector at the Base of the Telescope Tube. While Water from a Large Tank, in Which the Temperature is Automatically Controlled, is Circulated in Coils around the Mirror

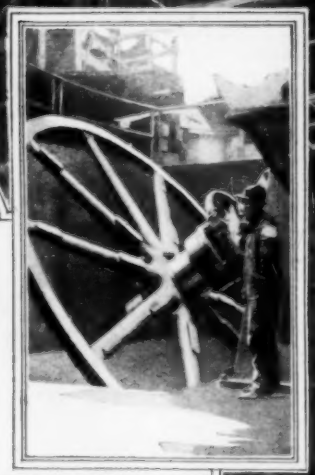
In the Central Part of the Picture the Mirror is Shown in the Polishing Machine. Powdered Carborundum was Used in Grinding, but for the Subsequent Polishing, Rouge was Employed. The Honeycombed Surface of the Polishing Disk, at the Right, Consists of Blocks of Resin, Faced with Wax, Set on the Wood to Hold the Rouge While the Glass Revolved on the Table. This Process would Remove Less than 1/25,000 Inch of the Surface if Continued Unceasingly for Two Weeks



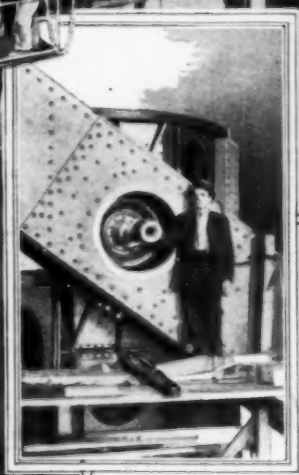
At the Left is Shown the Big Steel Yoke Which Serves as a Mounting for the Tube, While at the Right the First Section of the Latter Is in Place. The Floats on Which the Yoke is Rotated Are within the Cylindrical Members to be Seen at the Upper and Lower Ends. At the Bottom of the Right-Hand Picture may be Seen a Small Section of the Driving Worm Wheel, about the Circumference of Which Are 1,440 Teeth. The Cutting of the Latter Was an Extremely Delicate Piece of Work Requiring Great Skill





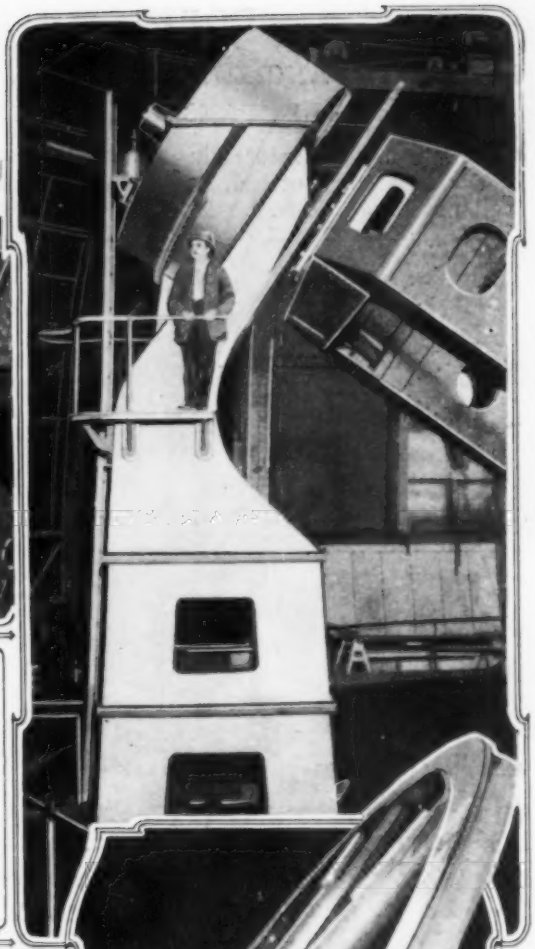


Above Is the Traveling Crane Used for Erecting the Telescope. It Also Provides a Means of Handling Heavy Parts of the Instrument at Times When Cleaning or Repairing has to be Done. The Apparatus Operates in a Grooved Track That Permits It to Crawl up and down One Side of the Massive Dome. The Picture was Taken by Flash Light While the Photographer was Lowered through the Roof on the End of a Hoisting Crane, Nearly 90 Feet from the Floor

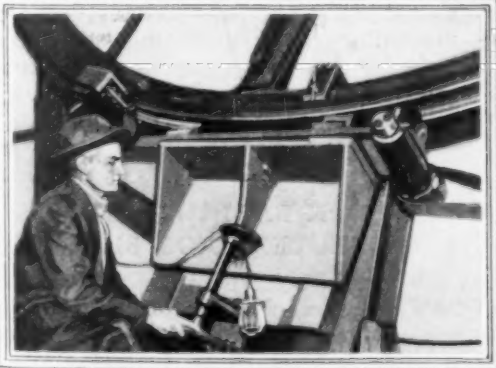


The Big Worm Gear Which Works in Conjunction with the Driving Clock That Keeps the Telescope Constantly Pointing at a Star Irrespective of the Earth's Movements. The Teeth about Its Circumference had to be Cut so That They would Not Vary More than 1/10,000 Inch

One End of the Axle on Which the Telescope Tube Swings in the Yoke. The Bearing Consists of Two Races of Balls and Two of Rollers, Which are Kept in Perfect Alinement by Means of a Special Mechanism Housed within the Walls of the Steel Framework



Above, and Also at the Right, are Presented Two Views of the Upper of the Two Big Bearings on Which the Yoke, Holding the Telescope Tube, Swings. These Bearings are Constructed as Accurately as Any Watch, the Permissible Error Being Only 1/10,000 Inch. Most of the Friction is Removed by Means of a Hollow Steel Float Lying in a Tank of Mercury. Auxiliary Instruments Weighing from a Few Ounces to a Ton or More, When Placed upon the Telescope, Necessitate Rebalancing It Each Time. For This Purpose Each Bearing Has a Gauge Which Controls the Level of the Quicksilver. In the Picture at the Right, the Small Cylindrical Object, That Appears to Be on a Platform near the Top of the Steel Ladder, Is One of These Instruments

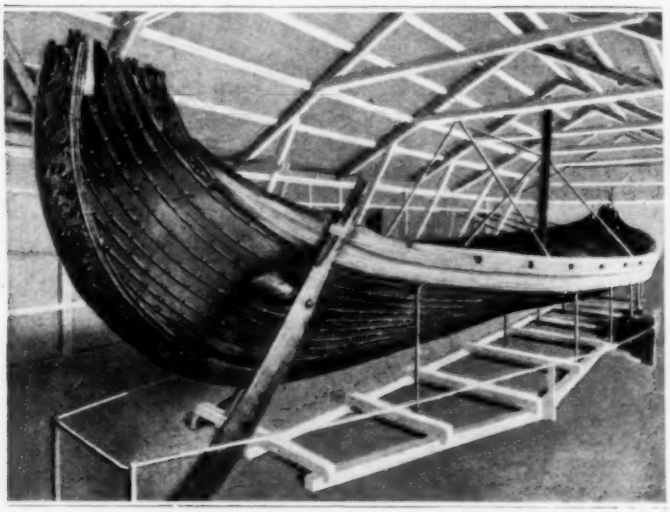


The Chief Instrument Maker of the Observatory and Two of His Skilled Mechanics Executed the Extremely Delicate Work of Cutting the Teeth of the Great Worm Gear, Which is Shown in Progress Here. After being Cut, the Teeth are Ground with Carborundum and Polished with Rouge. From Start to Finish, Accuracy has been the Paramount Requirement in Building the Telescope

This Shows the Gear Surface of the Big Cast-Iron Wheel Ready for the Painstaking Grinding and Polishing Work. The Danger of Damaging the Teeth While Transporting the Heavy Wheel to the Mountain Observatory, and the Need of Extreme Precision, Caused Those in Charge of the Work to Delay the Gear Cutting Until the Member had been Installed

EXCAVATE ANCIENT VESSEL REMARKABLY PRESERVED

Of late a most interesting memento of the Norsemen of old, a remarkably well preserved 70-ft. boat, believed to have been used in the ninth century, has been brought to light. It was excavated at Oseberg, Norway, at a point about two miles from the sea and at an elevation of some 50 feet. Structural details of the craft and the character of its decorations are considered to be unquestionable evidence that it was in use a hundred years or more before that intrepid viking, Eric the Red, discovered Greenland. As the boat was being uncovered, its pieces—which were not all intact—were numbered so that no difficulty was later encountered in the reassemblage at Christiania. The oak timbers were in such splendid condition that it was possible to steam them and give original shape to them and the boat. Except for one beam and a few pieces, only an inch or two in length, the vessel is composed entirely of its original timbers. The size of the boat makes it especially treasured.

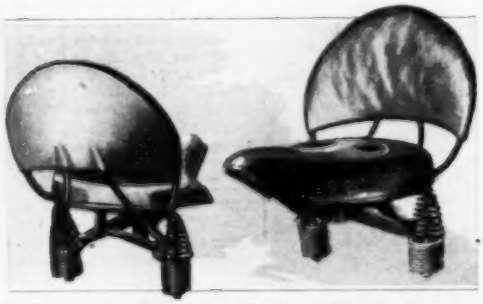


COURTESY MOTORSHIP AND MOTORBOAT

Although of Considerable Size, the Shape of the Boat Shows That It was Probably Used in the Narrow Inlets, or Fiords, of Norway, Not on the Open Sea

LOW LEATHER BACK FOR MOTORCYCLE SEAT

A new attachment for a motorcycle, which affords considerable comfort for a rider, is a crescent-shaped leather back which attaches to the seat by means of the same bolts that hold the saddle in place. The article is so low that it is not a serious inconvenience in mounting or dismounting. Particularly for those who take long rides and are troubled with backache as a consequence, the support will prove to be a rest-giving device.



A Comfortable Back for a Motorcycle Seat That is Attached by Means of the Screws Which Hold the Saddle in Place

EASTERN BATHING BEACHES PROTECTED FROM SHARKS

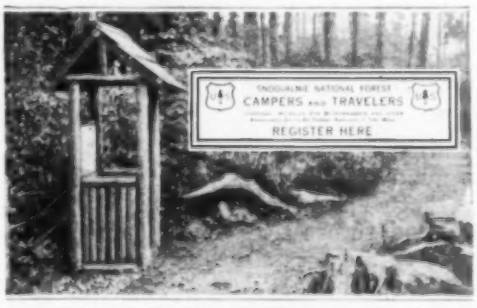
Precautions have been taken at the Atlantic coast resorts to prevent sharks from reaching the bathing beaches, and there seems to be little likelihood that the tragedies of last season will be reënacted during the coming summer at such places. Heavy wire nets and chain barriers were erected at most of the popular bathing points after the New Jersey incidences which terrorized vacationists from New York to Savannah. It is under-

Anchored to the Bottom and Made Fast to Posts, a Chain Barrier 500 Feet in Length Fences One of New York's Most Popular Bathing Beaches. The Pictures Above were Taken When the Net was being Put in Place

stood that the "shark fences" will be renewed, wherever broken, so that surf bathers will be safeguarded should the "man-eaters" make a second appearance, which, however, is hardly expected.

RUSTIC REGISTRY BOOTH IN NATIONAL FOREST

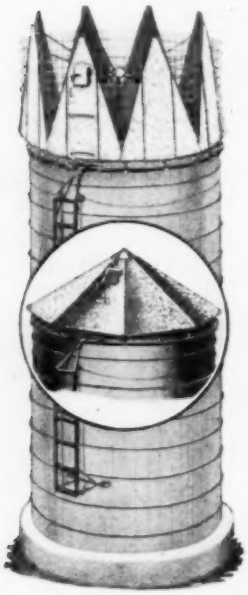
Travelers' registers were used in the numerous national forests of this country for the first time during the recreation season of 1916. They were to be found at the principal entrances, at the ranger stations, and other frequented points. Each contained space for 2,000 names, and every person entering one of the reserved areas was invited to record his name. One purpose of the registers was to make it easier for the rangers to warn, or rescue, persons in case of a forest fire, and to make more probable the delivery of telegrams or other important messages. In some instances, as in the Snoqualmie Forest, rustic booths were built to house the registers. In the one shown herewith the book is kept behind a hinged shelf, which when let down serves as a writing desk.



A Sign in Snoqualmie National Forest Inviting Travelers to Register Their Names, and an Artistic Booth Built to House the Register

SPECIAL ROOF INCREASES CAPACITY OF SILO

A sectional silo roof has been designed which can be opened in such a way that silage can be piled high above the permanent walls. In this way enough fodder can be put in storage at one time to fill the structure completely when settling has taken place. The ordinary silo is not only a dark, ill-ventilated place for the trampers to work in, but when the fodder has settled it leaves about one-fourth of the space vacant. This roof is pyramidal and is composed of triangular sections supported by an iron framework. Hinges at the outer edges permit the sections to be set in an upright position while the silo is being filled, thereby letting in light and air. Inside the opened roof, a woven-wire cylinder is placed to keep the excess fodder from falling off. When no longer needed this guard can be removed. Access to the top of the silo is gained by a movable ladder suspended from a track that runs around under the eaves.



NICARAGUAN CANAL PROJECT NO LONGER MENACES PANAMA

In ratifying a treaty by which the United States agrees to pay the Nicaraguan government $3,000,000 for the perpetual and exclusive right of cutting a canal across that republic's territory and thereby establishing a new passageway between the Atlantic and Pacific oceans, the government has made a significant, not to say important, move. The agreement gives us the Great and Little Corn islands as well as the authority to establish in the Gulf of Fonseca—which is considered to be, strategically and otherwise, the best Pacific-coast harbor south of San Francisco—a naval station. The Corn islands and Tigre Island, the latter within the mouth of the gulf, are to be heavily fortified. As a protection for Panama Canal, the value of a naval station in Central America and fortified bases in the Caribbean is obvious. On the other hand the Nicaraguan canal rights are probably of equal, if not even greater, importance. In recent years the practicability of constructing the long-proposed waterway, which would make use of the natural advantages offered by Lake Nicaragua and its outlet, the San Juan River, cost less than half as much as did Panama Canal, and provide a route shorter than the existing one, has come to be realized by engineers. The military and commercial danger to Panama Canal would have been momentous had a foreign power undertaken the enterprise. And of late two great nations are understood to have discussed the project in secret. The purchase of the option by the United States has therefore been timely.

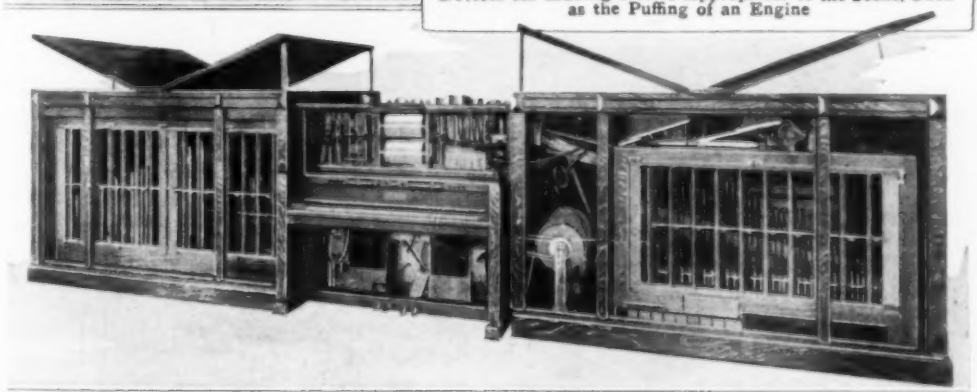
ADJUSTABLE PEDALS FOR THE MOTORIST

Among the auto accessories of recent invention are adjustable pedals, or pedal attachments, made to suit all lengths of foot reach. When these are attached to the regular brake and clutch pedals, two or more members of a family with varying reach can drive the same car in comfort. The attachments fit over the standard pedals, furnish a firm grip for the feet, and are readily adjusted at the required height by a locking bar.

MANY INSTRUMENTS COMBINED IN MOVIE ORGAN

Front View of a Musical Instrument Designed for Motion-Picture Theaters and Restaurants, Which Is a Combination of a Player Piano, a Reed and Pipe Organ, and Has Orchestra Attachments

Rear View, Revealing Some of the 412 Pipes and 195 Reeds. The Instrument is Also Provided with Various Ingenious Devices for Making Noises Appropriate to the Scene, Such as the Puffing of an Engine



Front View, with Panels Removed, Showing Part of the Complicated Mechanism with Which a Great Variety of Musical Effects is Produced. If Preferred, the Instrument can be Played Manually as a Piano

The special musical needs of the motion-picture theaters have been largely responsible for the development of an instrument, made in California, which, under the direction of a single operator, can produce the soft tones of a piano or a symphony orchestra, or it can be changed instantly to give forth the crashing harmony of a brass band. Musicians in motion-picture theaters

are often required to change quickly from one selection to another, according to the scenes. The effect of a picture is heightened, also, if certain sounds, such as the warning of an automobile horn, are introduced at the proper moment. The instrument referred to is constructed to meet all these requirements. It is a combination of a player piano, a pressure reed organ, and pipes producing the effect of an orchestra, and has in addition a large number of special attachments. It is operated electrically, uses ordinary 88-note roll music, and is equipped with a patented device whereby the operator can shift instantly from one music roll to another. If preferred, the piano or the organ can be played alone, manually or mechanically, or as many of the orchestral and band attachments can be introduced as desired. The largest size in which this instrument is made is 21 ft. long and 5 ft. 2 in. high. A skilled operator can produce music having no suggestion of mechanical playing and by pulling and releasing certain cords, which terminate above the keyboard, he can introduce at will such features as the sound of horses' hoofs, cow bells, an automobile horn, the whistle of a bird, and the like.

ANIMAL AMBULANCE HAS LABOR-SAVING DEVICES

An animal ambulance in which are embodied several special features, including labor-saving means for handling prostrate beasts, has recently been constructed for the Los Angeles Humane Animal Commission. The body of the car in which the creatures are carried is well padded and is hung low. It is provided with a rear and a side door and suitable means of approach. The side door is frequently utilized in leading a horse from the car in preference to backing it out. Concealed just back of the driver's seat is a windlass operated by the engine. When a horse cannot be led into the car it is hobbled and thrown, if not already prostrate, after which it is rolled over onto a platform mounted on rollers. With the aid of the windlass and rope the platform and its burden are drawn into the automobile. The car is provided with a gas outfit with which an animal in a hopeless condition can be put out of misery without delay or additional suffering.

Instead of Backing a Horse from the Ambulance It may be Led through the Side Door

Left: Rolling a Hobbled Horse onto a Wheeled Platform with the Aid of the Rope and Windlass, the Latter Shown in the Inset. Right: Drawing the Wheeled Platform and Its Burden into the Car

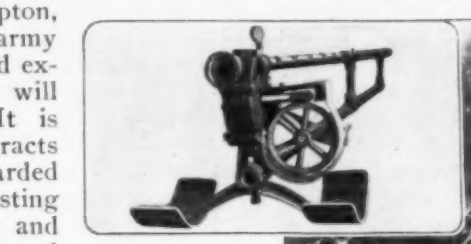
¶The War Department's aviation board has under consideration a plan for the enrollment of women fliers in the Army Aviation Reserve Corps. In time of war these pilots would form an auxiliary defense force that would be used back of the battle front.

BIG ARMY FLYING SCHOOL STARTED IN EAST

The cause of aviation in this country has been given a decided advance by the recent purchase of 1,169 acres of land near Hampton, Va., where an army aviation school and experiment station will be established. It is stated that contracts will soon be awarded for buildings costing about $1,500,000, and that eventually several millions will be expended. The contemplated equipment will include everything needed to test motors, aeroplane parts, materials used in the construction of aeroplanes and balloons, instruments used in the navigation of the air, and the testing of new inventions pertaining to flying.

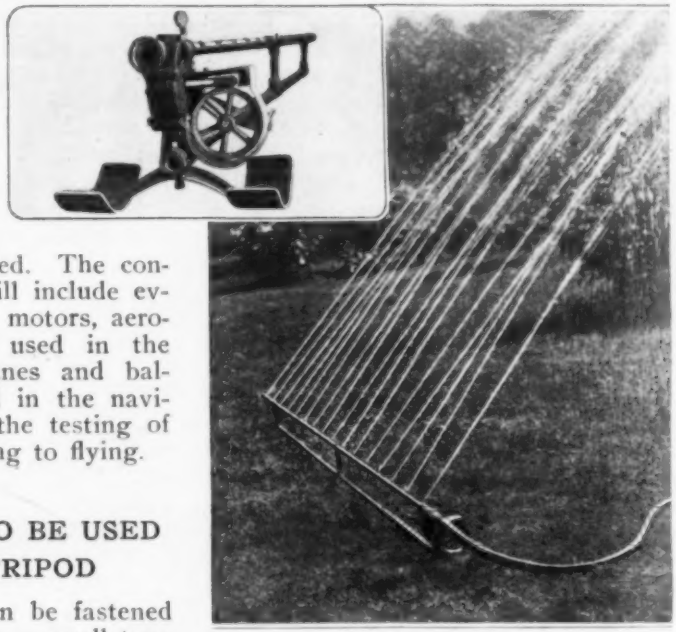
CAMERA CLAMP TO BE USED INSTEAD OF TRIPOD

Any hand camera can be fastened securely to a chair back, a small tree, fence rail, or post by means of a clamp recently placed on the market and designed to replace a tripod. It includes two stout wire hooks of different length, a locking lever, and a detachable chain which is needed only in fastening the clamp on objects exceeding 1 in. in diameter. The camera may be set in place either before or after the clamp is fastened to the object which is to serve as a support. If the latter is a post or a tree, or any other object up to 3 in. or 4 in. in diameter, one of the links of the chain is engaged in either hook of the lever. The clamp is especially useful in taking pictures with the camera downward.



LAWN SPRINKLER WORKS ON A NOVEL PLAN

In an efficient lawn sprinkler of novel design the pressure of water through a 1-in. hose drives a small turbine, the shaft of which is provided with a worm that turns a wheel geared to a crank, thus moving a long outlet pipe in a semicircle of 15-ft. radius. The pipe into which the water passes through the turbine has 16 outlet holes, and the water is emitted in the form of parallel sprays with the effect of a gentle shower. Each revolution of the wheel causes the pipe to swing with a circular motion that sprinkles the water over a total width of 30 ft. of lawn. In operation the apparatus is said to make an ideal lawn sprinkler.



New Lawn Sprinkler in Operation: The Photograph at the Left Shows Details of Its Construction, Including the Turbine, Worm Shaft, and Wheel That Swings the Outlet Pipe in a Semicircle

¶ It has been demonstrated at the experimental paper works operated by the Bureau of Standards, that a good grade of paper stock can be made from used twine and cord that is usually wasted.

TURNING VAGRANCY TO ACCOUNT

By LOUIS J. HENNESSEY

WITH railroads stretching their steel tentacles to the four points of the compass, Houston, Tex., like many other large American cities, has felt the necessity of providing employment for hundreds of tramps, hobos and other vagrants, who use the freight cars of the railroads as a means of travel. Instead of providing steam-heated cells and every inducement to preserve the spirit of idleness, Houston offers a farm where all town prisoners spend their terms.

Intimate contact with the class of humanity usually brought before the magistrate, led the mayor of Houston to believe that the system of dealing with minor offenders was wrong. In his estimation, a sentence spent in a town jail did not inure to the good of either the prisoner or the community. So he devised ways and means of relieving the city of the burden of supporting nonproducers, and incidentally offered the prisoners an opportunity to learn the elements of successful farming.

The Houston city farm embraces 319 acres of land just beyond the outskirts of the city. It is not the very best land obtainable, but part of the mayor's scheme was to prove the fertility of lands not generally regarded highly for agricultural purposes. In this he has succeeded. In 10 months' time the city farm has raised crops of cotton, corn, potatoes, sorghum, and peanuts, valued at approximately $10,000; this aside from the products used by the prisoners themselves.

An interesting feature of the Houston city farm is the large, well-ventilated "bunk house," used as sleeping quarters by the prisoners. Upon his arrival at the farm, the prisoner is led into the office of the bunk house, relieved of all his clothing, and introduced to a bath of cold, chemically treated water. The clothing worn by the prisoner is taken to a building apart from the bunk house, and thoroughly fumigated. Every vestige of vermin is removed. Garments worn by the prisoner during his sojourn on the farm are furnished by the city.

In caring for the creature comforts of the farm's guests, the city of Houston has overlooked nothing. The beds used by the prisoners are double-decked affairs, running the length of the bunk house. Sanitary mattresses are used. Midway between the compartments used by the white and negro prisoners, a series of shower baths and stationary washstands are conveniently located. Fresh linen is always obtainable, and strange as it may seem, men who have not averaged one bath a month, soon become accustomed to taking two a day—morning and evening.

A canning factory, operated as an adjunct of the city farm, provides employment for the female prisoners. Sorghum and sweet potatoes are marketed, as well as green peas. Separate accommodations keep the men and women apart, and there is no social contact whatever.

Work begins at 5:30, when the prisoners awake to the notes of a bugle. Ten minutes are set aside for the regulation "setting-up" exercises, and then all hands enjoy a breakfast which invariably includes fresh milk, eggs, and vegetables raised on the farm. Work ceases at 5:30 p. m., and the prisoners spend the evening as they see fit. Ample supplies of reading matter are kept on hand, and the morals of the men are always improved after a 30 or 60-day visit to the farm.

The buildings on the city farm of Houston have been erected at a cost of $15,153.50, and are designed with an idea of permanency. Other equipment, including farm implements, live stock, fencing, teams, etc., brings the total investment, exclusive of land, up to $23,765.91. It is estimated that the average cost of prisoner per month is $18.60, this including groceries, meats, feed for live stock, salaries of superintendent, assistants and matrons, and incidentals.

It is believed that the cost of caring

General View of the Buildings on the City Farm, Houston, Texas, Where the Municipal Authorities Provide Outdoor Work for Vagrants and Seek to Solve the Tramp Problem by Making "Weary Willies" Till the Soil

Interior of the Men's Bunk House: The Double-Decked Beds are Furnished with Sanitary Mattresses and Prisoners are Compelled to Keep Themselves Clean. Shower Baths Are Close at Hand and Bathing Soon Becomes a Daily Habit

Women Prisoners at Work in the Canning Factory: White and Colored Prisoners are Separated Except during Working Hours, and There Is No Communication between Men and Women

Prisoners at Work in the Fields: All Local Offenders Sentenced to Short Terms are Committed to This Farm, Instead of being Sent to Jail. The Tract Includes 319 Acres of Land Formerly Rated as Poor, but Vagrant Labor Raised Crops of Cotton, Corn, Potatoes, Sorghum, and Peanuts, Valued at $10,000 the First Year

for the town prisoners on the farm can be reduced one-half after the farm has been in operation another year. Practically every article of food consumed will be produced on the farm, and it is the intention of the city officials to make the institution a model in every respect.

HOW TO LIFT HELPLESS MAN FROM BURNING BUILDING

So far as the mere mechanics of the acts involved are concerned, many things, such as rescuing a drowning person from the water, overcoming an unexpected assailant, and removing prostrated victims from burning buildings, are often simple enough to perform providing resourcefulness rather than brute strength is used. There are many comparatively easy ways of accomplishing feats which might readily prove too much for an unthinking Hercules. Two methods of carrying a helpless person from a blazing building, when a ladder offers the only means of egress, were recently demonstrated. One of these makes use of the victim's coat, and the other provides for handling a disrobed person. In the first case, the coat is grasped by the collar, pulled down over the shoulders, and the tail wrapped so as to form a binding that holds the arms firmly above the elbows. The rescuer swings the victim onto his back and draws the twisted coat over his own head, thus leaving both arms free for negotiating the ladder. The other plan is to tie the victim's wrists together in front and carry out the rest of the procedure just recited, except that the man is lifted face forward instead of back to back.

TO BUILD ALASKA ROAD WITH CANAL EQUIPMENT

The Alaskan Engineering Commission, which is in charge of building the government's railway in Alaska, is to make a considerable saving in expenditure by using much of the equipment employed in digging the Panama Canal. Already 47,000 lb. of copper wire have been sent from the isthmus northward. Among other items which are to see service in a frigid as well as in a tropical region, are 50 flat cars, 11 locomotives, two steam shovels, and five dump cars. Four of the engines weigh 112 tons each and six are 42-in.-gauge engines with a weight of 33 tons each. All of the rolling stock except the narrow-gauge engines has been changed from the isthmian standard gauge of 5 ft. to the United States standard of 4 ft. 8½ inches.

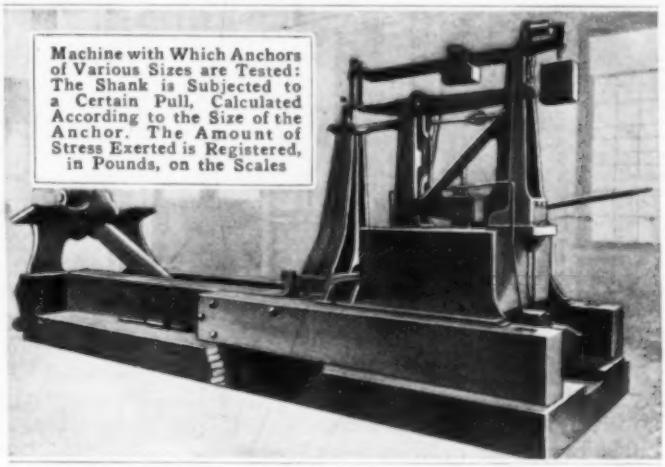
CONVENIENT VIAL FOR KEEPING SERUM

Of special interest to the medical profession is a vial recently devised in France in which certain kinds of serum can be kept ready for use at any time. It consists of a small bottle having a rubber stopper, from the lower end of which hangs a little tube, for holding a gram of serum in a dry state. The tube extends down into carbolized water that partly fills the bottle. When the serum is wanted the tube is removed and its contents emptied into the liquid, in which it quickly dissolves, and the solution is then ready for use.

¶In 1915 the Wisconsin state hatcheries included in its distribution to the lakes and streams of the state 10,500,000 brook and lake-trout fry and 143,000,000 wall-eyed pike.

APPARATUS FOR TESTING STRENGTH OF ANCHORS

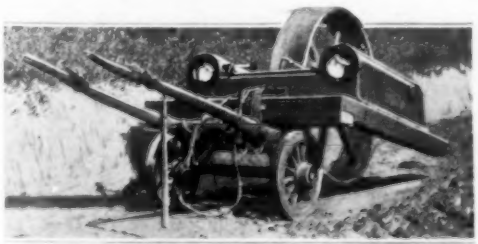
When a ship is anchored in a storm the safety of the vessel depends quite as much on the strength of the anchor itself as upon the cables connected with it. Hence the test to which an anchor is subjected before it is put into service is an important one. The majority of the anchors used in the United States Navy and on merchant ships are of cast steel. They weigh from 200 to 20,000 lb. The parts of each are carefully tested before being assembled, by dropping them from certain heights and by hammering their surface to detect any flaws. No defects being found, the parts are put together and the anchor is placed in a machine such as is shown in the illustration. By this means a pull, calculated according to the size of anchor, is exerted on the shank. The scales, which form a part of the testing machine, are set so that when the desired maximum of strain has been reached, the beam rises and then the pull is relaxed. The anchor shown here weighs 20,000 lb. and is for one of the new United States dreadnaughts.



Machine with Which Anchors of Various Sizes are Tested: The Shank is Subjected to a Certain Pull, Calculated According to the Size of the Anchor. The Amount of Stress Exerted is Registered, in Pounds, on the Scales

MACHINE TRANSPORTED ON ITS OWN BELT WHEEL

In South America the transporting of heavy machinery to its destination sometimes proves a more difficult task than the selling of it. The Brazil office of an American concern recently sold a large air compressor, which was to be delivered during the rainy season to a point in the mountains. The road was muddy and had many sharp turns and there was no wagon heavy enough to haul the big load. It was finally decided to assemble the machine partly and place one end on a wagon while the rest of the weight was borne on the big belt wheel which trailed at the rear. This member proved broad enough to prevent its sinking in the mud, and the arrangement made it easy to follow the abrupt turns in the road. When going downhill, a wedge was inserted between the wheel and the frame to serve as a brake. With 18 head of oxen, and nearly as many men, the machine was moved five miles a day.

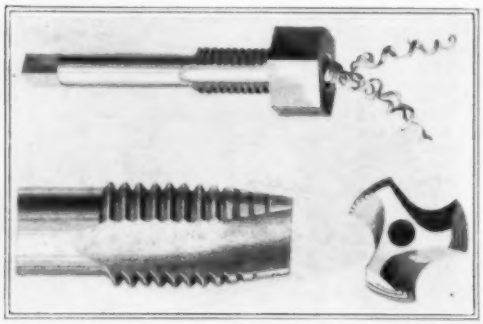


A Heavy Air Compressor being Transported through a Mountainous Region in South America, Supported by Its Own Belt Wheel and a Heavy Cart

¶The recently launched battleship "Mississippi," of 33,000 tons full-load displacement, is the third vessel to bear that name, the first having been the flagship of Commodore Perry at the time commerce was opened with Japan.

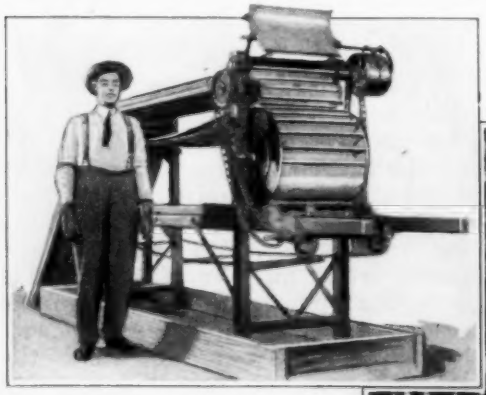
TAP THAT CUTS METAL IN NEW WAY

A tap for cutting nuts, and for similar uses, has been manufactured



Views of New Tap Showing Flutes of Special Design Which Give the Tool Great Durability and Enable It to Operate with Less than Ordinary Pressure

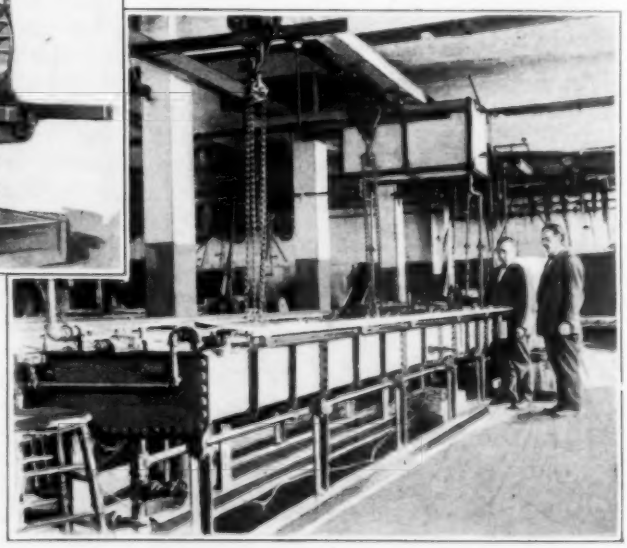
by a Massachusetts concern, which is so designed that it shears out long curls of metal instead of cutting the material into fragments, as is commonly the case with ordinary taps. Each of these tools has three flutes which extend down its sides parallel with its axis until they reach a point a short distance from the cutting end. Here each flute is diverted to one side at a slight angle. The cutting edge of the flute forms an acute angle and the opposite edge an obtuse angle. As the tool revolves in the metal it shears out the chips, as already stated. The curls so cut are discharged from the hole as fast as they are made, whereas the fine chips cut by an ordinary tap often accumulate in the hole, and to remove them the tool has to be backed out. This tap operates with less pressure than is usually required. It also wears longer and seldom breaks. It cuts true to size in all kinds of materials.



This Invention Dispenses with the Labor of a Large Number of Children Formerly Employed to Arrange Herring on Racks Preparatory to Sending the Fish to the Cooking Machines

LABOR-SAVING MACHINES IN FISH-PACKING TRADE

In the great changes which have come in the fish-packing industry in recent years, particularly on the Maine coast, two machines have played an important part. One of these has revolutionized the method of cooking sardines, cooking large quantities at one time. This cooker will hold 700 cans immersed in olive or cottonseed oil, which is heated to boiling by superheated steam. Each can is covered with a temporary perforated top which keeps the fish from floating out of the containers while being cooked. The machine discharges the cans at the rate of



A Machine Which Cooks Sardines in Boiling Olive or Cottonseed Oil, Brought to the Required Temperature by Superheated Steam, and Discharges Them at the Rate of 65 Cans per Minute

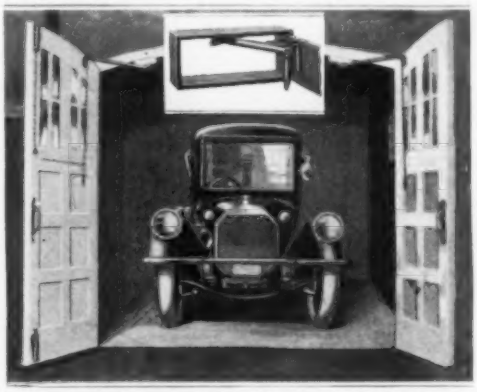
65 per minute, at the same time placing an air-tight cover on each, so that they are ready to be sealed. The other machine referred to does the work which, in the larger factories, formerly required 100 to 200 boys and girls. These children were employed to "flake" herring, that is to place them side by side on racks in which they were sent to the roasters or steam-cooking chests. Now this is done by a machine which carries the herring on an endless belt, consisting of trough-shaped units, to the racks where they are deposited in the position desired. Both of these machines were invented by a resident of Lubec, Maine.

MINER'S ELECTRIC LAMP OF IMPROVED FORM

An improved form of miner's lamp, recently approved by the United States Bureau of Mines, has a battery case of either sheet steel or aluminum connected by a 43-in. rubber-coated copper cable to the electric lamp on the miner's cap. The lamp is a steel shell with reflector and a ½-cp. bulb having a guaranteed life of 300 hours. The total weight of the outfit is approximately 4½ lb., the cap lamp itself weighing only 4 oz. No gas being generated by the battery, it is explosion-proof; all parts are also waterproof.

HOLDERS FOR GARAGE DOORS SAFEGUARD MOTOR CAR

Both convenience and accident insurance are offered by holders which prevent the wind from slamming the doors when a car is being driven into or out of a garage. The device is of simple, stanch construction and may be applied to curved-top doors as easily as to ordinary ones. It does not interfere with casual opening or closing, but enables a pair of doors to be locked back in an open position so that the chance of their smashing against a car, breaking the lamps or denting the fenders, is obviated.



When the Holders are Installed, There Is No Danger of the Wind Causing the Garage Doors to Slam against a Car as It is Entering or Leaving the Building

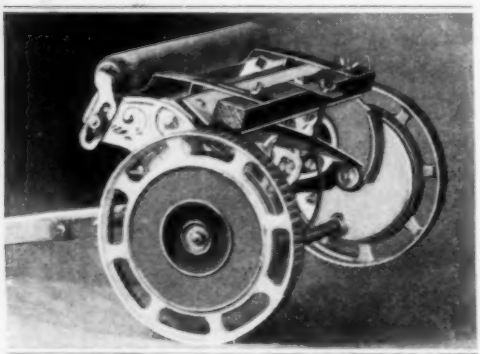
HOLLOW CONCRETE SPHERE IS A DANCE HALL

A building of reinforced concrete, recently erected as a dancing pavilion at an ocean resort in California, is constructed in the shape of a perfect hemisphere. The diameter of the sphere is 101 ft. and the building rests upon 16 concrete pillars, the spherical portion being raised 12 ft. from the floor. The walls are composed of reinforced concrete. Light is admitted through a skylight at the top, 40 ft. in diameter. As the building has no supports except the pillars around the circle, there is an uninterrupted area, 100 ft. in diameter, for dancing.

Hollow Hemisphere of Concrete Used as a Dance Hall at a California Ocean Resort

LAWN-MOWER SHARPENER OF NOVEL KIND

As the spiral blades of a rotary lawn mower revolve they are made to sharpen themselves by an ingenious



Lawn Mower with Sharpener Attached and Ready for Use: The Wooden Block Bearing a Strip of Corundum is Clasped to the Roller Which Normally Rests on the Ground, and Fastened to the Axle between the Wheels

device recently patented by a young man of Portland, Ore. The sharpener is made to clasp on any lawn mower and may be attached quickly and used by a novice. It sharpens the blades in a few minutes, as the mower is being run over the lawn, by their rotation against the grinding element of the attachment. This grinding element is a bar of corundum, which is attached to a block of wood. The rest of the device consists of the arrangement by which it is made fast to the mower in such a position that the blades or knives come into contact with the grinding surface as they rotate, while the corundum strip is held under slight tension so as to produce a square, even, and sharp bevel on the knives.

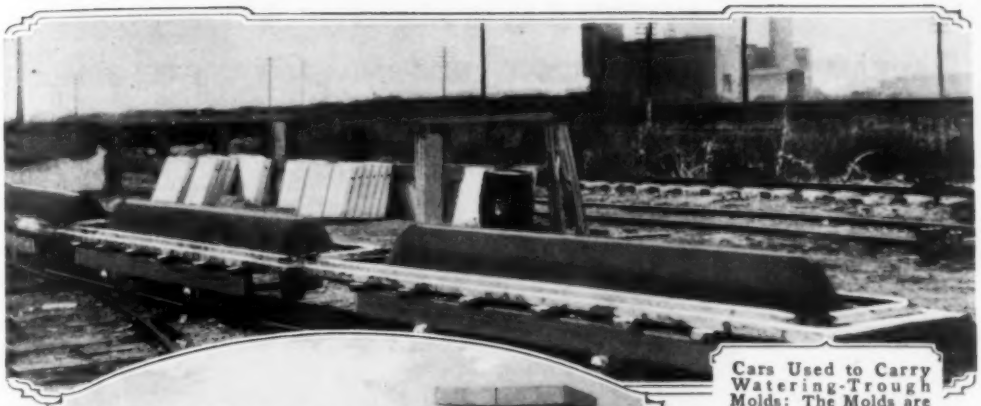
LINSEED-OIL TREATMENT FOR DYING TREES

A curious method of reviving languishing or dying trees was reported recently to the French Academy of Agriculture after being tested successfully in experimental gardens at Autun. The earth was first removed so as to lay bare the larger root branches, in which longitudinal slits were then cut and kept open by wedges. These cuts were well rubbed with linseed oil and after awhile numerous small roots appeared, forming a sort of fur, and the trees so treated rapidly gained new life and vigor. The method was recommended for trial in the case of languishing fruit trees.

CENTRALIZING CONCRETE WORK OF A RAILROAD

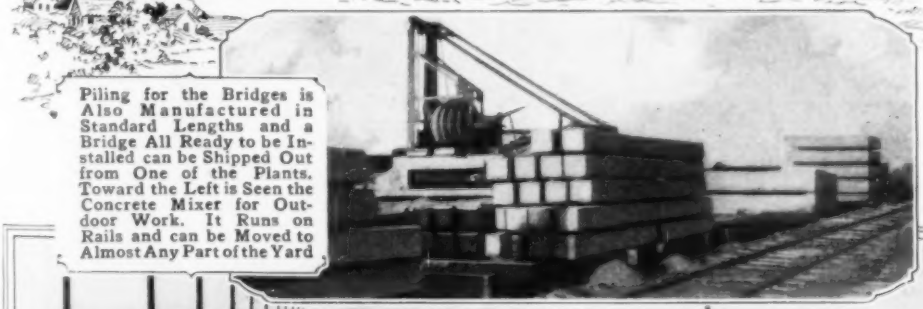
An advance step in the manufacture of concrete products has been taken by a western railroad, which has established factories at Galesburg, Ill., Hannibal, Mo., and Havelock, Neb., for the execution of work for the entire system, instead of making their concrete products wherever they were needed, as has been the general practice heretofore. This plan makes it possible to standardize all products, mold them in sections ready to put together, and then ship them out over the line; complete concrete bridges, as well as watering troughs, fence posts, and cement curbing for the station platforms in small towns being turned out by the factories. Concrete bridges are made in sections all ready to be put together. Huge slabs of reinforced concrete are made in 14, 16, and 20-ft. lengths, and with a width of 7 ft. Two are fitted together sidewise, giving a width of 14 ft. to the single-track roadbed, while as many are placed end to end as are necessary for the length of the bridge. Even the piling for the bridges is made in standard lengths at the nearest plant and shipped out ready to be installed. Depot curbing is made in short sections, corners and all.

Several practical features characterize the plant at Havelock, Neb. Though but 60 ft. wide it is nearly five blocks long. To handle the huge concrete slabs, which weigh anywhere from 13 to 25 tons, a huge traveling crane has been installed which runs the entire length of the plant, and also serves to unload material. The concrete mixer runs on rails directly over a row of molds and is moved to any set of forms it is desired to fill.



Cars Used to Carry Watering-Trough Molds: The Molds are Seen on the Cars. Whenever a Trough is Completed It is Run Out of the Building on These Little Cars. All Hand Labor is Done Away With. A Huge Crane Surmounting the Entire Plant is Used for Loading and Unloading the Products and Material

Bridge Slabs, All Ready to be Installed: Huge Slabs Such as These Form the Component Part of Bridges and can be Shipped Out to Any Point on the Line on a Moment's Notice. Under the Old Plan They would have been Made on the Spot



Piling for the Bridges is Also Manufactured in Standard Lengths and a Bridge All Ready to be Installed can be Shipped Out from One of the Plants. Toward the Left is Seen the Concrete Mixer for Outdoor Work. It Runs on Rails and can be Moved to Almost Any Part of the Yard

General View of One of the Three Factories Established by the Burlington Railroad for Standardizing Its Concrete Work: This Plant is Located at Havelock, Nebraska. Though but 60 Feet Wide, It Is Five Blocks Long. Some of the Watering Troughs are Seen in the Foreground

STEAM SHOVEL LIFTS ITS OWN WHEELS

A steam-shovel engineer recently decided to hasten the slow operation

This Shows How a Steam Shovel was Raised from the Ground by Its Own Power, So That Planks could be Inserted under the Wheels. With the Bucket Lowered to the Ground, the Power was Turned On, Which Tilted the Whole Machine

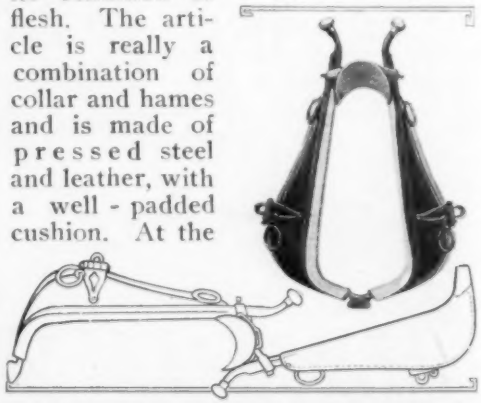
of placing planks under the wheels of his ponderous machine in order to move it along. He made the shovel aid in lifting up the wheels. By lowering the steel bucket flat against the ground and then applying the power of the engine as though excavating, the entire apparatus was tilted until one wheel was a foot from the ground.

VAST TRACTS OPENED UP FOR STOCK RAISERS

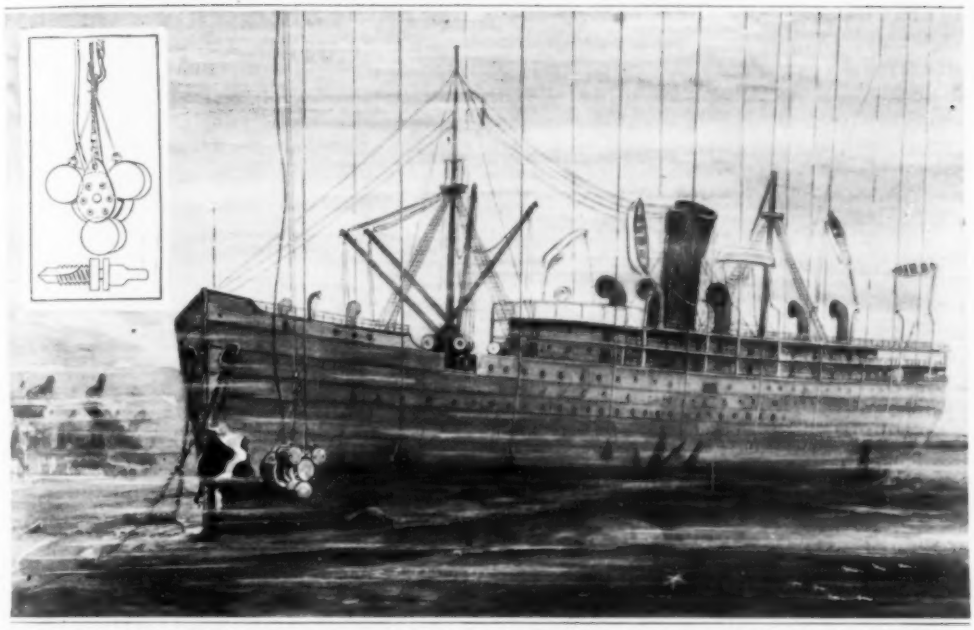
The signing by the president of what is known as the 640-acre stock-raising homestead law will result in the opening up to settlers of public lands in the West many million acres in extent. Under this law the land must be taken up for stock-raising homesteads, and for no other purpose. The total cost for filing on 640 acres, which is the maximum amount allowed per individual, is $34. Improvements must be made and cattle raised at the outset. One object of this measure, which has the approval of the Department of Agriculture, is to open up areas which are valuable only for grazing and raising forage crops, do not contain merchantable timber, and cannot be irrigated from any known water supply. The act is so worded that it will bring only bona-fide settlers into the regions opened up. Special precautions are being taken to prevent large corporations from gaining possession of territory by subterfuges. Colorado estimates that the opportunities offered will bring 100,000 persons to that state alone, within a year.

ADJUSTABLE HORSE COLLAR AND HAMES

It is so important that the collar worn by a draft horse be properly fitted, if he is to do his full share of hauling, that the majority of owners of heavy teams exercise great care in getting collars for their horses that are the right size. A new collar has been placed on the market which can be adjusted 4 in. in width at the top, 3 in. at the bottom, and correspondingly as to length, so that it can be well fitted to an animal no matter what its condition of flesh. The article is really a combination of collar and hames and is made of pressed steel and leather, with a well-padded cushion. At the top is a swivel joint which hinges the halves together so that they are easy to handle in harnessing and unharnessing. The collar is equipped with a self-adjusting neck pad.



Combination Horse Collar and Hames Which can be Adjusted Both as to Length and Width at the Top and Bottom. It is Made of Pressed Steel and Leather



Near the Bow of the Sunken Vessel Is a Device, Held in Place by Magnets, Which Screws to the Hull a Plate Attached to the End of a Hoisting Cable. Other Cables are Shown Already Attached. A Diagram of the Mechanism Appears in the Insert, together with a Detail of a Combination Drill, Tap, and Bolt

MAGNETIC DEVICE FASTENS CABLES TO SUNKEN SHIPS

A ship-salvaging device has been invented by a resident of Seattle, one of the interesting features of which is that it employs electromagnets to hold the apparatus to the side of the sunken vessel, thereby making it unnecessary to employ divers for such work. The apparatus has not yet been given a practical test, so far as is known, but the type of service which it is intended to perform by its unusual use of magnets suggests an enlarged field of application. It is provided with three electromagnets placed about a watertight case containing an electric motor. When the apparatus is about to be used the case is filled with compressed air to withstand water pressure. The motor operates a set of boring instruments, each of which is a combination drill, tap, and bolt. A steel plate, in which are holes properly placed, is fitted over these drills and to the plate a hoisting cable is attached. The device is lowered to the desired point close beside the sunken ship and then the magnets are energized so that they fasten themselves to the steel hull. This is indicated above water by the lighting of three bulbs. When the motor is started the drilling instruments begin boring into the hull. They are so made that at the proper time they break off, so that the mechanism can be raised to the surface, while the plate to which the hoisting cable is attached remains bolted to the hull. When enough cables have been attached in this way the raising of the vessel can begin.

OLD HULL SUPPLIES SALT WATER FOR BATH POOL

A most ingenious means of profitably utilizing a wrecked and abandoned boat hull is that applied in the case of the "Seminole," which is now used as a floating tank to haul salt water for a public swimming pool in Oakland, Calif. The "Seminole" was one of two river boats which collided in San Francisco Bay and was so badly damaged that the hull was rescued with difficulty but never re-

turned to service. In Oakland is a salt-water swimming pool which had depreciated in value because of the difficulty of getting clean water. A shipyard owner, seeing an opportunity for a good investment, bought the hull at a low figure and also acquired control of the pool. He then laid a 4-in. pipe from the pool to a dock in the estuary two miles away, where he tied the hull. On the latter an 18-hp. pumping plant was installed. From time to time what once was the "Seminole" is towed out to Golden Gate and allowed to fill with 750,000 gal. of clean salt water. It is then brought back and its contents pumped through the pipe line to a reservoir serving the pool. The popularity of the baths has greatly increased now that the bathers are sure of salt water practically as clean as the open ocean.

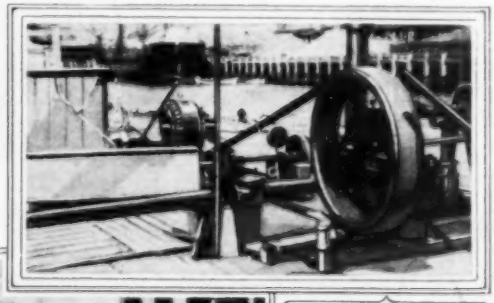
Swimming Pool Now Supplied with Clean Sea Water by the "Seminole," Which Serves as a Water Barge

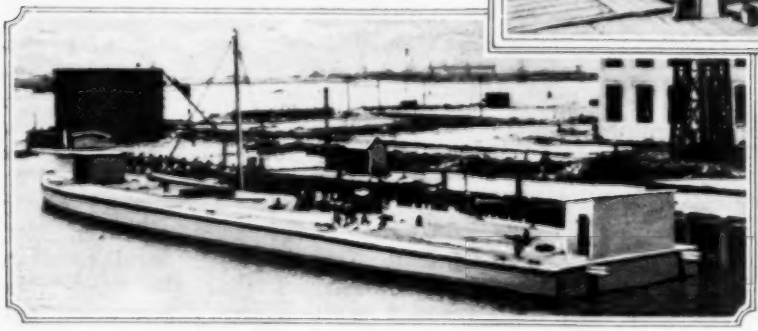
PEACH AND APRICOT SEEDS USED AS FUEL

Hundreds of tons of peach and apricot seeds, which have been thrown away every season heretofore by the canning factories in the great fruit districts of California, are now sold as fuel and bring $2.50 a ton retail. Formerly the seeds were considered too hard for fuel, but recently it was found that when heated in a stove burning hard coal they soon pop open and ignite, after which they burn with an intense glow like that of anthracite, and are practically smokeless, besides holding a fire well. This discovery at once gave the despised seeds a market value, and they have become a source of profit to the canners who formerly discarded them as worthless.

HEAVY DONKEY ENGINE CARRIED BY TRUCK

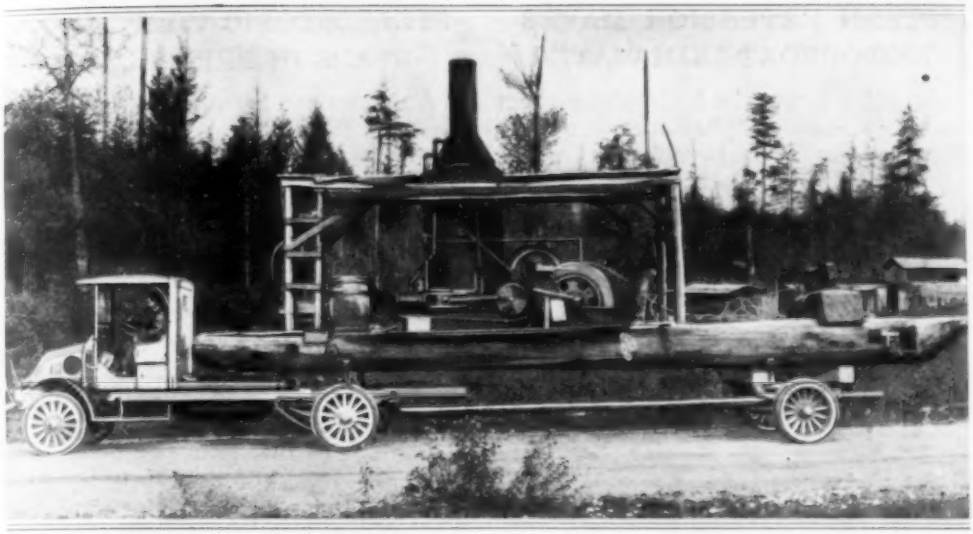
A motor truck was called upon to do extra-heavy duty in the big woods near Seattle recently, when it became necessary to move a 15-ton donkey engine to a new location. The feat was accomplished by setting up the engine on two big logs, laid side by side, making all firm by a wooden





Above: View on the Deck of the Barge, Showing the 18-Horsepower Pumping Plant

Left: Hull of the "Seminole" at the Dock Where It Connects with a Two-Mile Pipe Line through Which the Water is Pumped



Carrying a 15-Ton Donkey Engine on a Motor Truck in the Washington Woods

superstructure. The whole contrivance was then placed on a semitrailer, long enough to accommodate it, and attached to a 3½-ton motor truck. The truck responded gamely to the unusual load and carried it the required distance along a state road, thus demonstrating a new use for the motor truck in the lumber business.

OLD PAPER MADE INTO NEW BY CHEAP PROCESS

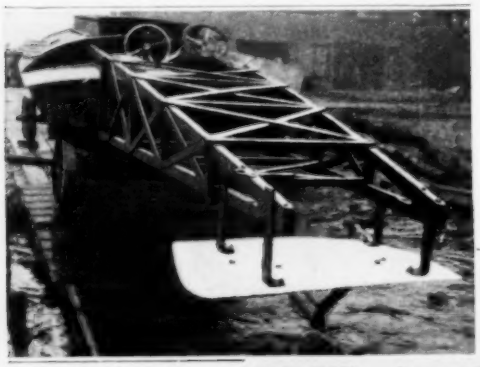
Some relief from the paper shortage, it is thought, may result from the discovery of a new process by which old newspapers can be used in producing fresh news-print paper. Experiments were made recently with three tons of old dailies and the new paper made from them is described as being whiter than the original. One of the objections to using old papers in the past has been that under the usual treatment the heat applied to the pulp caused it to turn a bright orange, thus making it unfit for use. The new method is essentially a cold process and involves a different chemical treatment so that a white product is possible. The cost of this process is said to be under $5 per ton. Certain manufacturers are reported to be much interested in the new method.

GOOD POINTS ARE EMBODIED IN PUBLIC DRINKING CUP

Two objectionable features of the sanitary cup, such as is commonly employed with the so-called drinking fountains installed in public parks and elsewhere, have been overcome in the construction of a new article of this character. The depression of a thumb lever opens a valve and causes the water to fill a small chamber before flowing through openings in the rim of the bowl and forming a cone-shaped bubble. This arrangement dissipates the back pressure and prevents a shaft of water from spurting up as the valve is first opened. When fountains of this sort are used chiefly by children, it is quite a usual thing for some youngster to place one hand over the cup and squirt the water. When such a thing is attempted with the new device, the water is forced into tubes and carried into the drain pipe. Thus both spouting and squirting are obviated.

STERN EXTENSION MAKES MOTORBOAT SKIM WATER

In order to get the hydroplane effect and increase the speed of his motorboat as much as possible, a racing enthusiast of White Bear Lake, Minn., has equipped the boat with a framework extension at the stern, which supports the propeller at its outer end. To carry the additional outboard weight there is a metal shield with a slightly curved surface above the propeller. When the boat is running fast this glides along the surface, lifting the false stern clear into the air, while the bow is also lifted and the rest of the hull merely skims the water. The high-powered engine has automobile control.



Rear View of Motorboat Extension, Showing the Metal Shield over the Propeller and the Construction of the False Stern

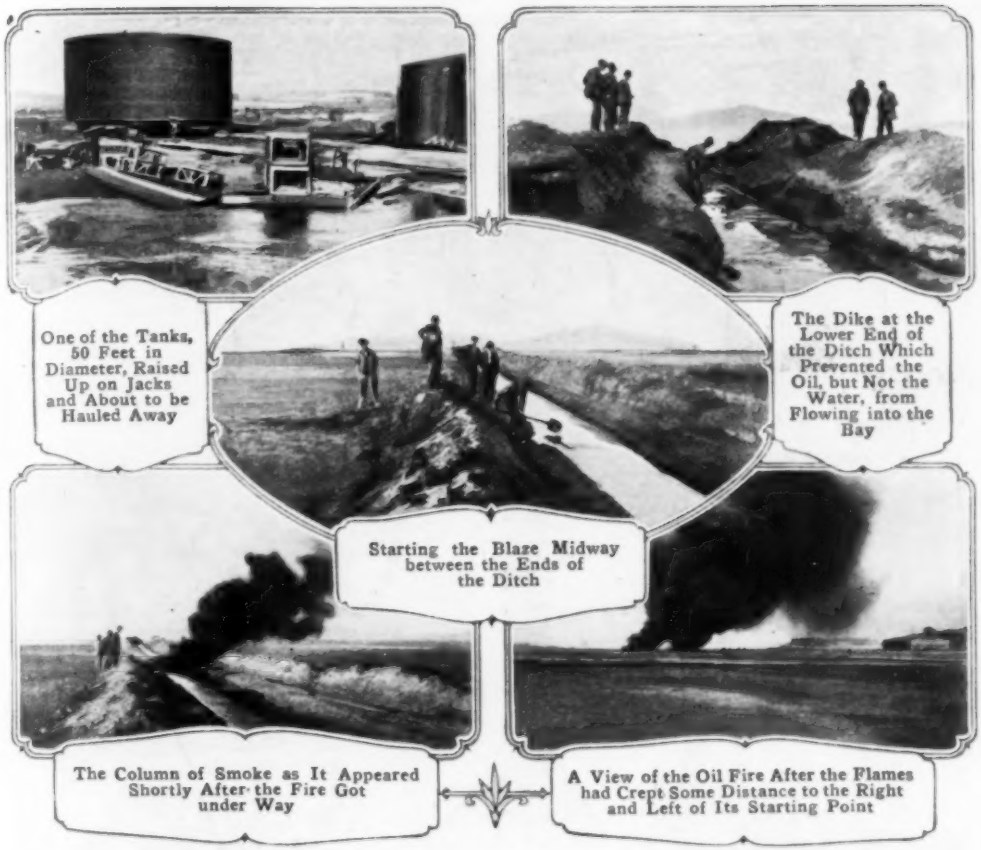
Motorboat with Novel Stern Extension, Designed to Carry a Curved Shield along the Surface with a Lifting Effect at High Speed

STEREOSCOPIC VIEWS SHOW STARS IN PERSPECTIVE

An American astronomer, borrowing the idea from Germany, has prepared stereoscopic views of the heavens, which have been found to portray celestial bodies in vivid perspective. These pictures are especially suited to popular use in the study of the stars. The illusion of perspective is obtained by allowing an interval, perhaps of several years, to elapse between the taking of the two pictures used at one time in the stereoscope. This difference of time generally permits the body photographed to move enough to present two slightly different aspects to the beholder. In one instance two exposures used were taken 14 years apart, and the resulting effect of depth in the heavens was pronounced very beautiful. This appearance of perspective the astronomer has found hard to explain in certain cases, for sometimes there has been no observable motion in the object photographed. Furthermore, it was discovered that a pair of photographs from the same negative, showing the Milky Way in one of the constellations, conveyed this same sense of distance when viewed through the stereoscope. These experiments suggest a most interesting field for investigation.

OIL WASTE BURNED AFTER PUMPING IT INTO DITCH

When land adjoining San Francisco Bay was cleared preparatory to erecting the Panama-Pacific Exposition buildings, one of the difficult tasks which the workers faced was the disposal of two large oil tanks and quantities of oil waste which had accumulated while the tanks were in use. To pump the waste into the bay, half a mile away, would have been to violate the law and seriously injure shipping, as well as harm the game birds which might alight in the oily scum. The tanks were disposed of by jacking them up and hauling them to another location. It was decided to burn the oil, but to do it in such a way that it would be kept well under control. A


One of the Tanks, 50 Feet in Diameter, Raised Up on Jacks and About to be Hauled Away
The Dike at the Lower End of the Ditch Which Prevented the Oil, but Not the Water, from Flowing into the Bay
Starting the Blaze Midway between the Ends of the Ditch
The Column of Smoke as It Appeared Shortly After the Fire Got under Way
A View of the Oil Fire After the Flames had Crept Some Distance to the Right and Left of Its Starting Point

ditch 4 ft. deep was dug from the site of the tanks, sloping gradually down to the bay, and filled with water. A dike was constructed at the bay end to keep the water from flowing out except through a passageway under the barrier. The oil waste was then pumped into the ditch and, because it was lighter, spread out over the water from the tanks to the far end. After one or two unsuccessful attempts the oil was set on fire midway between the ends of the ditch. The flames traveled toward each end about as fast as a man would walk. A wind blowing toward the water hastened the blaze moving in that direction. All of the oil was consumed as the fire progressed and produced a vast double column of black smoke that drifted across the sky for many miles, and attracted considerable attention because of its peculiar formation.

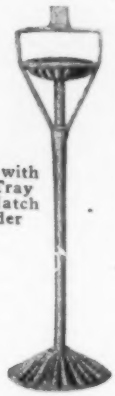
GERMAN CONCERN FOUNDED TO INSURE UNSAFE RISKS

Persons in Germany who are unsafe life-insurance risks can now insure themselves, a company having been organized to issue policies to those to whom the standard concerns decline to give protection. The new movement is the result of a conference of the leading insurance companies in the empire who agreed that in these war times, particularly, all classes should be insured. Since about 10 per cent of the applications coming to German concerns are refused, it is evident that this new undertaking will fill a large gap. Rates and conditions upon which unsafe risks will be taken have been formulated. Some 18 companies have contributed money to the new corporation, which has a capital of about $700,000 at the present time.

SUGGESTIONS FOR WARM-WEATHER FURNISHINGS

Magazine Stand 30 Inches High with Serviceable Side Pockets for Newspapers

The Cushioned Chair Shown Here is Hinged to the Crescent-Shaped Desk, and When Not in Use can be Swung Forward Out of the Way

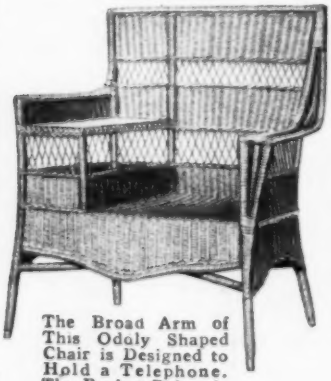


Stand with Ash Tray and Match Holder

Hall Stand with Two Compartments for Umbrellas, One for Rubbers, and a Convenient Drawer

Hall Tree Provided with Many Hooks, Well Suited for Use with Stand Shown at Left

An Advantageous Feature of This Rather Quaint Tea Wagon Is Its Ample Shelf Space

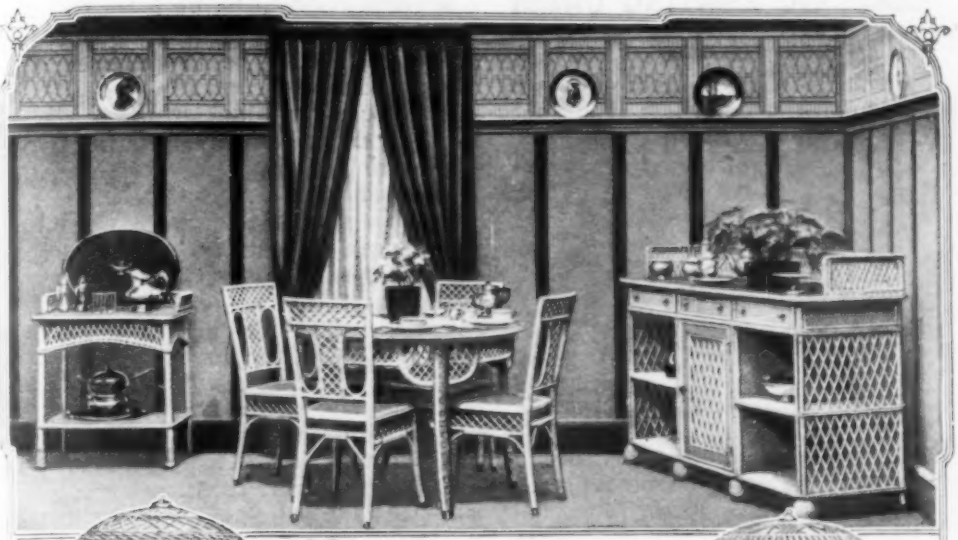


The Broad Arm of This Oddly Shaped Chair is Designed to Hold a Telephone. The Pocket Below is for a Directory

A Most Inviting Chair with High Curved Back and Broad Arms. The Portable Reading Lamp Matches the Chair

Jardinière and Stand Well Suited for Living Porch or Summer Cottage

SHOWING REED ARTICLES IN GREAT VARIETY



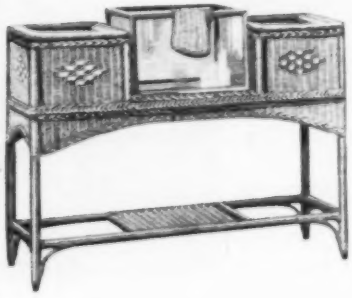
The Cool, Airy Effect Produced by Using Reed Furniture Exclusively, Makes an Apartment, as Shown in the Breakfast Room Above, Most Attractive. While Light, These Articles are Strongly Built and will Endure Steady Usage Well

The Bright-Hued Cretonne Lining in the Shade of This Hall Lamp Lends a Desirable Touch of Color to Any Room Furnished in Reed

The Openwork of This 28-Inch Indirect-Light Globe Produces an Artistic Illumination Effect

An Artistic Hall Lamp of Fine Weave but Substantially Made, Well Suited for Use the Year Around. It is Provided with Three Electric Bulbs

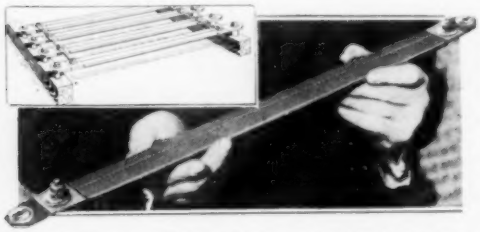
Another Example of Pleasing Latticework Effect. This Table is Designed to Stand in a Corner and can be Used as a Writing Desk



An Aquarium Stand, 31 Inches High, Provided at Either End with Boxes for Ferns or Flowers

ELECTRIC HEATING UNITS FOR WORKMEN

Workmen who are more or less exposed to winter cold, like crane operators, shearmen and tablemen in steel plants, can now be warmed in their uncomfortable cabs by a type of electric heating units recently adapted for the purpose. The new heater is an inclosed steel-jacketed unit, resembling a flat ruler, 2 ft. long, 1½ in. wide, and 3/16 in. deep. The steel jacket incloses a heating element and this is in turn inclosed in mica. Either direct or alternating current can be used, and the units can be installed either singly or in groups.



Electric Heating Unit, Which can be Used in Groups as a Stove for Workmen in Exposed Positions

¶ It is hoped that Federal aid can be secured for a proposed school of fisheries at the University of Washington in the state of the same name. Such an institution would be a great aid to all engaged in the fishing industry on the north Pacific coast.

LAKE BOAT LENGTHENED FORTY FEET

By inserting a big section of steel hull in the center of the pleasure boat "City of Toledo" its owners increased the length of the craft from 212 to 252 ft. and its passenger capacity from 1,375 to 1,954, or more than 40 per cent. This interesting piece of ship alteration took place a few months ago in Detroit. After the vessel had been drydocked it was cut in two amidships. Ground ways were placed under the forward half, together with greased sliding bilge ways, packing and poppets, in the same way as launching is prepared for. Heavy tackle was then fastened to the bow and with the aid of a steam winch this half

Boat Cut in Two Amidships, Preparatory to Inserting a 40-Foot Section of New Hull

Pleasure Boat the Passenger Capacity of Which was Increased from 1,375 to 1,954 by Lengthening It 40 Feet

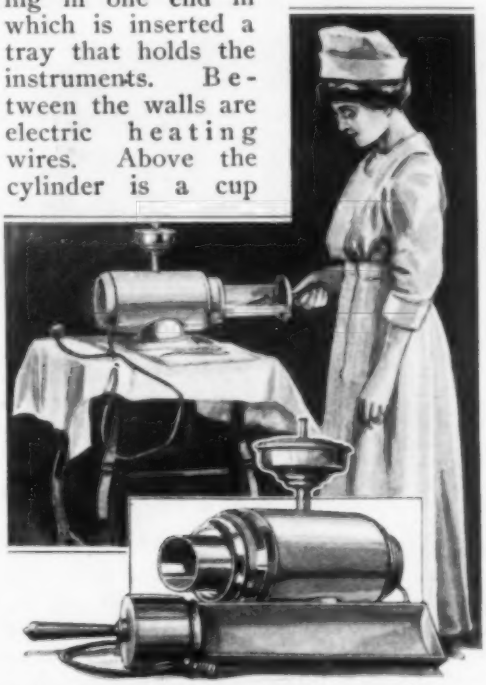
was drawn forward 40 ft. The section of the steel hull was then built to connect the halves. At a point about 30 ft. forward of the midship frame the width of the new section was increased 27 in. at the light water line and the body faired into the original lines forward and aft. This was done to increase the stability. The lengthening made it possible to construct a ballroom 50 ft. square on the promenade deck. A system of cantilever beams was used to support the upper deck. In this way few obstructing posts were required in the ballroom. The two original boilers, each having three furnaces, were displaced by five return-tube boilers, each having two furnaces. The new boat has two smokestacks instead of one. Another feature is space in the forward part of the vessel for motor cars, which form a large part of the cargo.

TRAINS CARRY OFFICIAL STORM SIGNALS

Whenever the weather bureau predicts a storm, a blizzard, or a cold wave the trains of a western Kansas railroad display the appropriate government weather flags as warning signals for trackmen, bridge gangs, and other employes of the road. Farmers and other residents along the line also get the benefit of the signals and appreciate them. The forecast of a storm, when received in the daily weather bulletin at the general offices of the road, is wired to all train conductors, who promptly place the signal flags, indicating the kind of weather expected, on special staffs mounted on the engines, at each side of the smokestack.

NEW STERILIZER OPERATES QUICKLY AND AT LOW COST

A compact, almost instantaneous sterilizer is now being used by physicians, dentists, etc., which sterilizes instruments at atmospheric pressure with steam generated by electricity. It can be operated in full view of a patient. The apparatus consists of a double-walled chamber with an opening in one end in which is inserted a tray that holds the instruments. Between the walls are electric heating wires. Above the cylinder is a cup from which water can be made to drop at any desired rate. The water drips through a tube and down between the walls, where it is converted into steam by the heated wires. The steam then passes through holes into the chamber and, together with the direct heat from the wires, will sterilize an instrument in 30 seconds.



An Apparatus Which Sterilizes in 30 Seconds, with Steam Generated at Atmospheric Pressure by Electricity

ADJUSTABLE DISPLAY CASE FOR ADVERTISING MATTER

To permit advertising booklets, catalogues, and railway time-tables of different sizes and shapes to be advantageously displayed in offices and public places, a cabinet is being made which is so arranged that the vertical compartments in each tier can be adjusted to various widths. Metal spacers are fitted into a channel attached at the back of each row. When one of these members is moved to a

desired position and turned vertically, a slot in its upper edge engages a metal bar that extends across the front of the

The Compartments in Each Row can be Adjusted to Accommodate Booklets of Various Widths

row to prevent pamphlets from falling out. So long as the divider is in this upright position it is held firmly against movement. This scheme makes it possible to display a narrow time-table and wide descriptive booklet side by side.

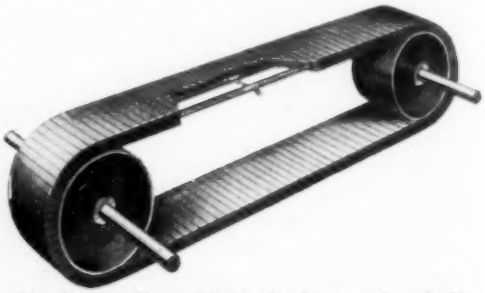
AMERICAN ADAPTS AFRICAN CARRIER TO BABY'S NEEDS

Instead of being rocked to sleep in a regular cradle, the baby of a certain American missionary in Africa often takes its nap while being carried through the jungle in a crib, swung from a pole that rests on the shoulders of two native bearers. The novel conveyance looks a little like a palanquin from India, but really is an adaptation of an African conveyance called a "machila." When the baby's parents are not on the road, the little one's bed is unslung from the pole and placed on a canvas cot, or swung between two trees like a hammock.

A Modernized African "Machila" in Which the Baby of an American Missionary in Africa is Carried by Natives from Place to Place

SELF-ADJUSTING BELT FOR MACHINERY

A new nonslipping belt recently placed on the market by a South Dakota company is built of sections of leather, cut and punched by special machines and forced over lengths of coil springs, the number of springs depending on the width of the belt. In making a belt of any desired length, the ends of the springs are coupled and



This Picture Shows Plainly the Construction of a New Nonslipping Belt, Made of Sections of Leather Forced over Coil Springs

hinged on a pin which passes crosswise through one section of leather and is clinched on the outer edges. The leather sections are set close together and edgewise, so that the wearing surface of the belt falls on the end grain of the leather, which gives the best wear. Being under constant pressure from the concealed springs, the belt is said to cling to a pulley with surprising tenacity. The springs are made of steel piano wire and will retain their original tension, it is claimed, under any working conditions. When placed upon the pulleys where it is to work, the belt is adjusted under a slight tension which keeps it constantly tight and prevents slipping.

NEW SURGICAL USE FOR SAUSAGE SKIN

In cases of stricture of the esophagus, which is the canal through which food passes to the stomach and which is situated behind the windpipe, it is very important to secure an early diagnosis. A New York hospital physician reports a new method which gives a clear outline of malignant strictures and is also a readily applied aid in the treatment of moderate cases. A small length of sausage skin, which is the fibrous coat of the intestine of the hog, is thoroughly washed and treated with formaldehyde and glycerin, then formed into a bag by tying one end with silk floss, the other end being slipped over a rubber tube and tied. The bag, which is now only a string, is then easily swallowed by the patient with the aid of a little water, and a thick bismuth mixture is allowed to flow into it, after which X-ray pictures show the outline of the stricture clearly.

SAFETY RULER PREVENTS INKY FINGERS

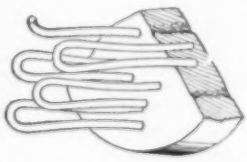
A ruling device that is claimed to be the only safety ruler known has been invented by an Ohio man. Its safety lies in the novel construction, which prevents inking the fingers and smudging the book or paper when ruling, as is common with ordinary rulers. The new ruler consists of two graduated boxwood strips, forming sidepieces and connected at the ends by T-bars of polished aluminum which support two parallel nickelplated wires, or bars, in the open space between the sidepieces. The ruling is done on these wires, which are always elevated above the surface to be ruled.

NEW OILCAN MINIMIZES WASTE OF OIL

An oilcan with useful features has been designed by a young inventor of Smithton, Ill. The dome-shaped can is fitted with a false bottom in which are two leather valves, operated by pressure on the real bottom below, which is expanded and flexible. A spout with bent end runs down through the body of the can and is connected to the false bottom, so that oil can only pass into it from the pressure chamber formed by the false bottom, through one of the valves, thus preventing waste. The second valve admits the supply of oil to the pressure chamber, and there is a filling spout in the dome, with a filtering screen. In operation, when the bottom is pressed, oil flows through the first valve into the spout; when the pressure is released, a vacuum is created in the pressure chamber and new oil is drawn in from the can.

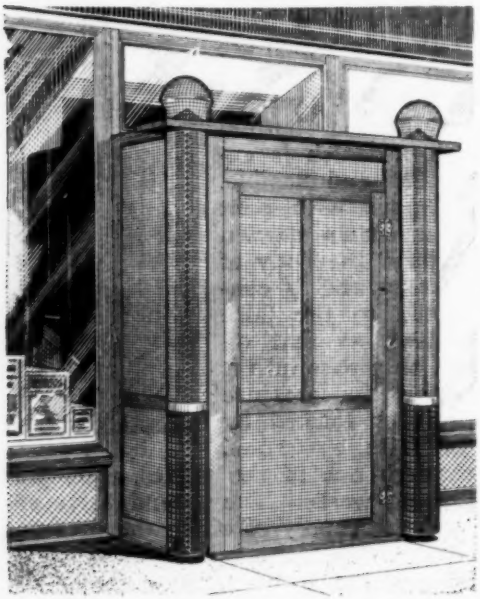
U-SHAPED BRISTLES USED IN NEW TOOTHBRUSH

Many dentists condemn the stiff-bristle toothbrush, especially when it causes continual laceration of tender gums. With this point in mind, a Pennsylvania inventor has sought to produce a less objectionable article by imbedding both ends of the bristles. Although it is possible that extra attention would be required if such a brush were to be kept sterile, it is easy to see that the looped bristles would not scratch so much as ordinary ones.



NEW SCREENED ENTRYWAY IS TRAP FOR FLIES

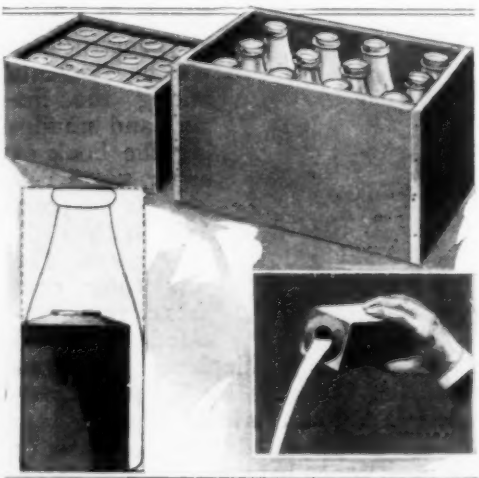
For capturing and exterminating house flies that invariably swarm around the doors of grocery stores, restaurants, and similar places, an Illinois man has devised a new type of trap. He makes use of a screened vestibule and at the corners of it, on either side of a swinging door, provides two vertical screen cylinders which extend from the sidewalk to the top of the inclosure. A metal channel piece, that has a row of perforations, is incorporated in each of the wire columns on the inside of the inclosure. Flies congregate within the screened vestibule in preference to the darker interior of the building, and in due course are supposed, in their quest for light, to enter the screened columns through the holes provided in the metal strips. Once inside, they climb upward and eventually pass through a cone trap at the top. In this compartment, from which escape is impossible, they reach poison bait and die. It is argued that the flies on the outside of the building will, in seeking entry, gather at the sides of the vestibule nearest the store windows, instead of swarming in front of the screen door itself. In actual use the arrangement is said to have proved helpful.



The Lower Part of the Screen Columns are Reinforced with Heavy Netting, While the Traps at the Top may be Removed and Cleaned from Time to Time

FIBER VESSELS REPLACING GLASS MILK BOTTLES

Air-tight, paraffined fiber containers for liquid and other food products are gradually being adopted by distributors and retailers, and accepted by consumers in certain localities as preferable to glass bottles, jugs, and other vessels. A receptacle that may be destroyed after being used once is of particular advantage in marketing dairy products, for the chipping of glass milk bottles, the possibility of contamination due to their improper sterilization, the loss through breakage, and the inconvenience alike to consumer and dealer occasioned by the necessity of their return, are all serious drawbacks. Therefore it is interesting to note that in several western cities milk, buttermilk, and cream are being delivered in sanitary, spruce-fiber containers that may be destroyed after they have once been used. Packages of the same character, provided with large openings,

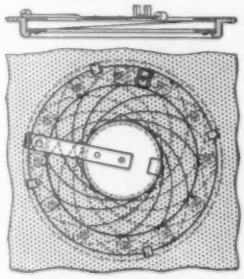


By Comparing the Two Cases Above, the Amount of Space Saved by Fiber Containers is Indicated. The Contrast between the Square Can and the Ordinary Milk Bottle Is Even More Noticeable. Liquids can be Poured from the Receptacle Freely

are also being made for grocery stores, so that bulk vinegar, oysters, olives, pickles, strained honey, cider, and similar commodities, may be handled conveniently and carried to customers in thoroughly sanitary, clean, and attractive packages. These containers are strong enough to withstand fairly rough handling without leaking, while their contents are not affected through contact with the paraffin coating, which is colorless, odorless, and tasteless. The packages are available in different sizes and when purchased in quantities are of reasonable price. They may be sealed as easily as ordinary milk bottles, and in a delivery wagon have the advantage of occupying much less space than glass bottles of similar capacity.

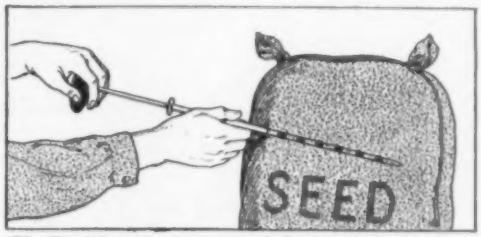
STOVE LID MADE LIKE AN IRIS DIAPHRAGM

A kitchen-range cover has recently been patented in Sweden which is so constructed that an opening can be made in it of any size up to the limit of the device. It somewhat resembles an iris diaphragm of a camera or microscope and is a very convenient article in that it enables a housewife to place dishes of various sizes, even down to a small cup, directly over the fire. The cover is opened and closed by means of a lever to which a knob is attached.



DEVICE FOR SAMPLING CONTENTS OF SACKS

A simple tester has recently been devised by means of which a sample can be secured of the contents of a cotton, or burlap, grain bag without going to the trouble of opening the sack. It consists of a pointed brass tube, 13 in. long and ⅜ in. in diameter, in the side of which are six oval openings. In the tube is a plunger provided with a convenient handle. To obtain a sample the pointed end of the tester is inserted through the bag to the desired depth, after which the plunger is withdrawn. This allows the seeds to flow into the tube through the oval holes. After the tester has been removed, the samples which it contains can be emptied out through its open end.



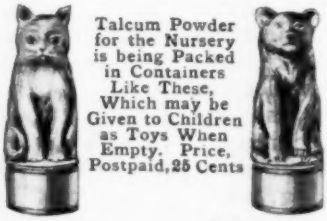
The Seed Sampler is Inserted through a Grain Sack, After Which the Plunger is Withdrawn, Allowing Seeds to Flow into the Tube through Holes in Its Side

SCREW EXTRACTOR WORKS LIKE A CORKSCREW

A new tool lately placed on the market is designed to save the time and labor hitherto required for the removal of all kinds of broken screws, studs, and stay bolts, which has always been a long and troublesome job. This screw extractor is made of tough steel and operates on the principle of an ordinary corkscrew. When a setscrew, cap screw, or stud snaps off, the machinist equipped with this tool, it is claimed, need only drill a small hole in the broken part and insert the extractor, giving it a slight twist to the left to seat it firmly in the hole. On further twisting, it bites its way into the screw, secures a purchase, and backs the broken screw out on its own threads. When a wrench is brought into play the most stubborn screw comes out without damaging the threads of the hole.

SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

Tea Set Consisting of Caddy and Kettle-Shaped Tea Ball with Stand. It is Packed in Satin-Lined Calfskin Case. Price $18.75



Talcum Powder for the Nursery is being Packed in Containers Like These, Which may be Given to Children as Toys When Empty. Price, Postpaid, 25 Cents

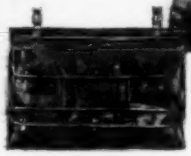
Stove Lid Provided with Lip Which Allows a Flatiron Handle to be Used as a Lifter. Price, Three-Pound Size, 75 Cents at Factory

Paddles for Mixing Pastry Shortening. Ingredients Rubbed between the Disks until Properly Combined. Price 25 Cents

Breakage is Prevented If Toilet Preparations are Carried in "Armored" Flasks When One is Traveling. Three-Ounce Size, $1

Many of the Little Things Needed in the Care of a Baby are Conveniently Arranged in This Dainty Toilet Screen, Which is Folded When Not in Use. Price, at Factory, $25

Dusting Cloth That Gloves the Hand and Protects It Somewhat from Dirt. Price 25 Cents; Canada 35 Cents



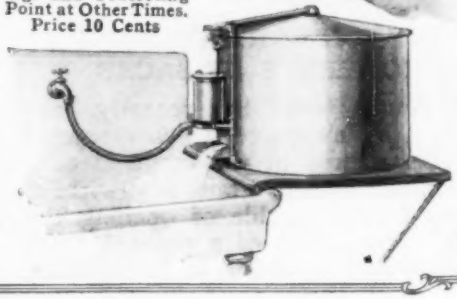
For Carrying Parcels in the Motor Car, Robe-Rail Bags like These Are Available for $5 and $6

This Glazed-Calfskin Desk Set Is Available in Different Colors, and Has a Border Design of Gold Tooling. A Removable Silk Cover for the Blotter is Provided. The Price Is $47.50

Sharpener That Remains on Pencil, Serving as a Grip for Fingers When Writing, and Protecting Point at Other Times. Price 10 Cents

In Addition to Its Beveled End, This Funnel Has a Groove Which Allows the Air to Escape from a Small-Necked Container as the Inflowing Liquid Forces It Up

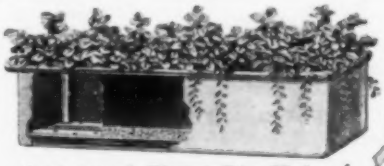
Compartments at the Ends of This Laundry Basket, a Recent Invention, Serve as Depositories for Clothespins



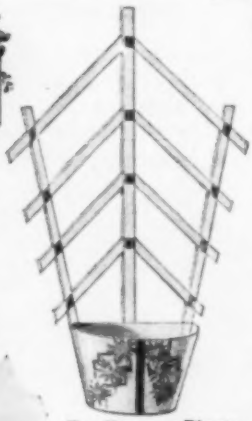
This New Dishwasher Uses the Water That Flows from a Hot-Water Faucet through a Soap Compartment to Actuate Revolving Sprays. Price, at Factory, $25

INTENDED FOR THE HOME AND ITS MEMBERS

Bookholder Suited for One Who Reads in Bed. It is Finished in White Enamel and Tastefully Decorated. The Price Is $5



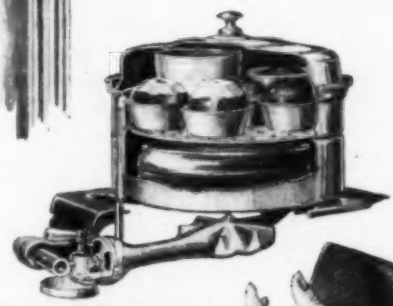
Subirrigated Flower Box Made of Galvanized Steel. Perforated Arches in Bottom Distribute Water and Allow Air to Reach Roots. Box, 35 Inches Long, $3



For Vines or Plants Needing Support, an Oddly Shaped Pot with Trellis Attached. Hand-Decorated

Adjustable Drying Rack for Towels and Baby's Linen. The Arms are Made of Ash and the Metal Parts Protected against Rust. This Type, with 24-Inch Arms, 65 Cents

Loosely Woven Hose Supporter Made Unusually Wide to Give Muscular Freedom. In Silk, 50 Cents



Compact and Serviceable Electrically Driven Coffee Mill, Operating at the Touch of a Button. It may be Attached to a Wall and Connected with Lighting Circuit. Price $16.50

Cooking Vessel Equipped with Regulating Valve That Automatically Controls Gas Flame, Enabling Meal to be Prepared without Usual Supervision

Flatiron Holder Intended to be Clamped to One End of Pressing Board, There to Serve Its Purpose without Being in the Way. Retails at 35 Cents

Y-Shaped Strap Permits Pocketbook to be Carried in Palm of Left Hand, or on Back of Right One Comfortably and without Inconvenience. Price $1 to $5

White-Enamel Steel Tray Intended to Replace Customary Plate and Saucer Used by Children. The Pictures Appear in Colors, While Numerals and Letters Are Black

For Furnace Registers, a Deflector Provided with Water Pockets, Besides Protecting Walls and Draperies from Hot-Air Currents, It Supplies Moisture to Atmosphere. Small Size, $1.25

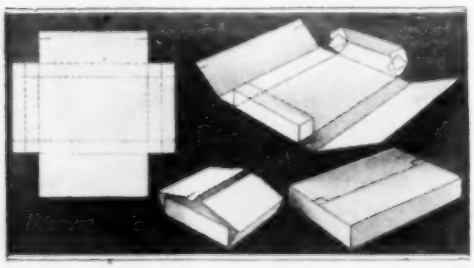
NEW EYES ARE CONTRIVED FOR SHIPS IN FOG

Inasmuch as one of the foremost electric companies has acquired the patent rights, there is considerable reason for the belief that a New York state inventor, who has developed a marine signaling system for the prevention of collisions between fog-bound vessels, has worked out a meritorious idea. Advantage is taken of the fact that close to the surface of the water fog is invariably thin, while a few feet higher it may be impenetrable. As near as possible to the water line of a ship, projectors, equipped with shutters so their light may be flashed intermittently, are installed. An observer, whose post is likewise as near the water as is practicable, is supplied with shuttered glasses connected electrically with the lamp shutters so as to operate in synchronism with them. Just before the projectors flash, the observer's glasses are screened, and an instant after the former are darkened the latter are opened. This arrangement protects the observer's eyes from the blinding glare of the light shafts emanating from his own vessel, but during the period of their extinction permits him to catch the gleams of signal flashes projected from a similarly equipped ship.

The Projectors are Mounted in Portholes near the Water Line of a Vessel, and Advantage is Taken of the Fact That Close to the Ocean's Surface Fog Is Usually Translucent

FOLDING PAPER BOX MADE IN ONE PIECE

Folding paper boxes are now used for a great variety of purposes, especially for packing laundry, suits, shirt waists, and stationery, and the usual construction has been in two pieces. A Michigan concern has invented a one-piece folding box that reduces the cost of manufacture by eliminating the necessity for expensive dies to stamp out the paper shapes or blanks. The new box is made in one simple operation, all the sides being cut on right angles. When folded, the corners are all reinforced, which prevents them from being crushed in shipment, and the cover flaps are interlocking. Boxes of all sizes can be made in this way.



How the New One-Piece Folding Paper Box is Made: At the Left Is a View of the Paper Blank, Then the Box is Seen in Process of Construction, and Finally the Box Completed and Locked

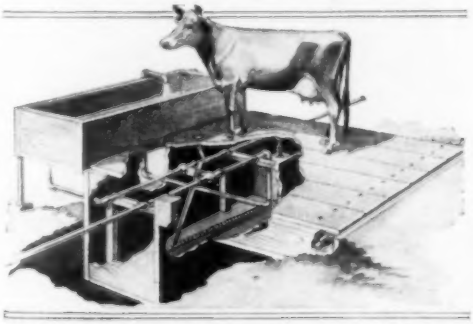
NEW PIER FOR HANDLING CANAL FREIGHT

Facilities for handling freight at the Atlantic terminal of the Panama Canal were largely increased this winter, when a new pier, 1,035 ft. long and 212 ft. wide, was put in service, although not quite completed. The pier is supported on 212 steel cylinders,

6 ft. in diameter and 125 ft. long, having their tops at water level, which were sunk by open dredging and filled with concrete reinforced by steel rails. Girders composed of continuous steel stringers carry the 11-in. concrete slabs, forming the floor. Of the 237,000 sq. ft. of floor space, 155,000 sq. ft. are inclosed and roofed, the shed being of steel framework with concrete walls and cement-tile roof. A railroad track runs outside along the walls, for handling freight unloaded from ship cargoes. The cost of the pier was $1,420,000.

WATERING TROUGH DESIGNED TO PREVENT FREEZING

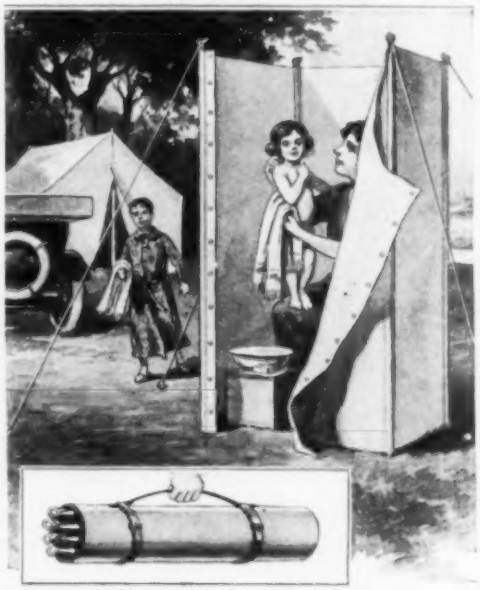
An automatic watering device, invented by a resident of Zion City, Ill., is operated by the approach of an animal to the trough to drink. By keeping the trough empty when not in use, it is said to obviate the difficulty so often experienced in winter by stock farmers, liverymen, and others, through water freezing in the trough. A platform is provided in front of the trough and held in a slightly inclined position by stout springs beneath. When an animal steps upon this platform, the weight depresses it, and a concealed shaft is rotated, which opens an intake water valve and simultaneously closes an outlet valve, allowing water to flow into and fill the trough. When the animal steps off the platform, the operation is reversed.



This Watering Trough is Filled Automatically When an Animal Steps on the Platform, and Emptied When It Steps Off. The Operating Valve Mechanism Is under the Platform near the Trough

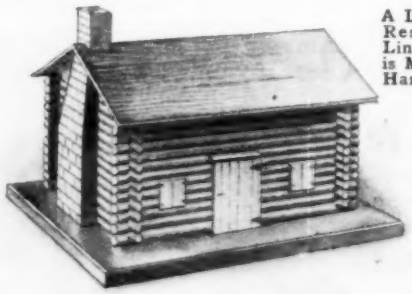
SPORTSMAN'S BATH TENT ROLLS UP COMPACTLY

The many possible uses for a small bath tent, invented by a Long Island man, make it particularly attractive for canoeists and sportsmen. It can be employed as a bathhouse, stretcher, canoe sail, ground cloth for picnics, etc. The shelter is made of a single strip of canvas measuring 12 by 6 ft. Sewed across it, every 3 ft., are pocket seams through which bamboo stakes are inserted. When the tent is set up these form the four corners. The two ends of the canvas are fastened together by clasps. Each pole is made in two sections, one being doweled to fit into the end of the other half. Guy ropes are provided to keep the walls taut. Rolled up, the tent makes a bundle, 3 ft. long and 7 in. in diameter.



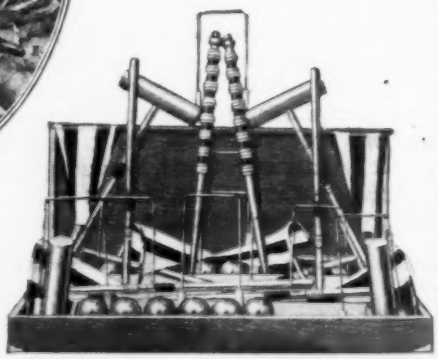
A Tent Six Feet High and Three Feet Square, Made of a Single Strip of Canvas Which, Together with the Stakes, can be Rolled into a Bundle Three Feet Long and Seven Inches in Diameter

¶A resident of Alaska is reported to have constructed an aerosled with which he made a trip of 1,100 miles from Nome to Valdez in 72 hours. The journey by dog team requires several days.



A Little Log Cabin That Resembles President Lincoln's Birthplace: It is Made of 69 Pieces of Hard Wood. Any Child Who Likes Blocks will Enjoy Building This Dwelling or Making It Over into a Schoolhouse or Church. Fifty Cents Is the Price of This Durable Set

Nursery-Rhyme Banks of Brightly Painted Wood: "Little Miss Muffet" is Shown Above and "Little Jack Horner" Below

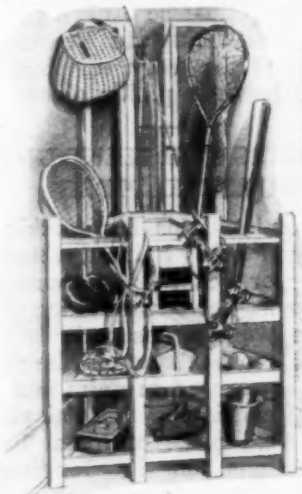


With This Croquet Set the Croquet Ground can be Changed into a Big Outdoor Pool "Table" on Which the Whole Family can Play. Six Striped Canvas Hoods Serve as Pockets at the Corners and Sides. There Are 15 Numbered Balls, and the Rules Are Similar to Those in Pool. These Combination Sets Cost from $5 to $12

Animal Toys with Detachable Parts so Made That Any Body can be Provided with Any Kind of Head or Legs, Thus Affording Endless Fun and Teaching Natural History Also

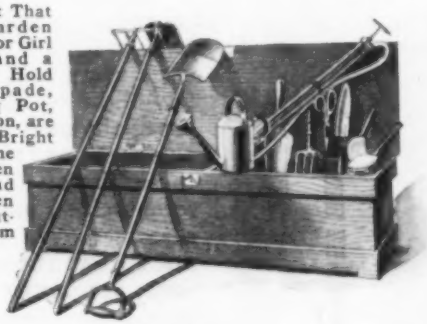
After Its Hopper has been Filled with Sand This Sand Crane Works All by Itself: The Bucket Fills Up, Swings Around, Empties Itself and Swings Back. This is Repeated Many Times Until the Sand is All Gone. The Outfit, Which Costs $1, is Well Made and Painted in Bright Colors

THAT APPEAL STRONGLY TO CHILDREN



There Is Truly "a Place for Everything" in This Handy Corner Rack. Built to Hold All a Boy's Equipment for Outdoor Sport. It can be Purchased Knocked Down for $2.80 to $5, and Is Easy to Put Together

Here Is an Outfit That Has All the Garden Things Any Boy or Girl would Want and a Strong Chest to Hold Them. The Spade, Rake, Watering Pot, Trowels, and So on, are All Painted in Bright Colors, and Some of the Sets Even Have Seeds and Blueprint Garden Plans. The Outfits Cost from $8.50 to $15



Just the Thing for the Child That Draws, and That Means Nearly Every Boy and Girl: A Light Drawing Outfit of Wood and Fiber Board Which Folds Up like a Screen. It Has Big Handy Pockets and a Blackboard That Isn't Black but Green, so as to Be Easy on the Eyes. The Cost Is $8 at the Factory

A Most Inviting Little Home for Birds, Made of Willow. This One Is Intended Especially for Some Mr. and Mrs. Chickadee, and Sells for $1.75 or $2, According to Finish

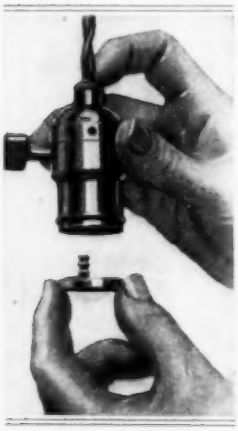
A New Adding Game for Little Folks and Grown-Ups: When the Ball Rolls to the Lower End of the Alley It Drops through One of Five Holes and Tilts Up a Corresponding Number Which must be Added to the Score. The Lower Alley Returns the Ball. The Outfit is to be Sold for $1

POCKET SCREWDRIVER HAS THREE BITS AND A REAMER

The compactness of a pocket screwdriver now on the market makes it very convenient for light work, especially as it is equipped with three bits of different sizes, and a reamer. When not in use these parts are carried inside the handle, which is hollow. The adjustable threaded ring by which a bit is held securely in position for use can be removed from the end of the handle and placed in the storage chamber together with the other parts. When the tool is assembled in this compact manner it is only 3¼ in. long.

ELECTRIC-BULB LOCK FITS ANY SOCKET

A new lock, which prevents the theft, or temporary removal, of an electric-light bulb from its socket, is of special merit in that it is simple and can be used with any standard socket or bulb. It consists of a thin brass ring of the same diameter as a standard socket, inside of which lies a flat steel spring. A short shank, attached to the ring, is inserted between the socket and end of the bulb when the latter is screwed into place. The flat spring is so placed that a bulb screws in without difficulty, but in trying to turn it in the opposite direction, the spring tends to spread out and acts as a lock. When a light is burned out it must be broken to be removed. The locks can be used repeatedly and are very serviceable in hotels and various public places.

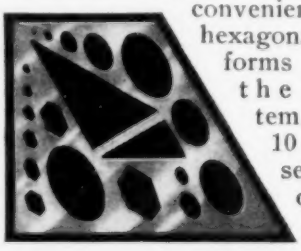


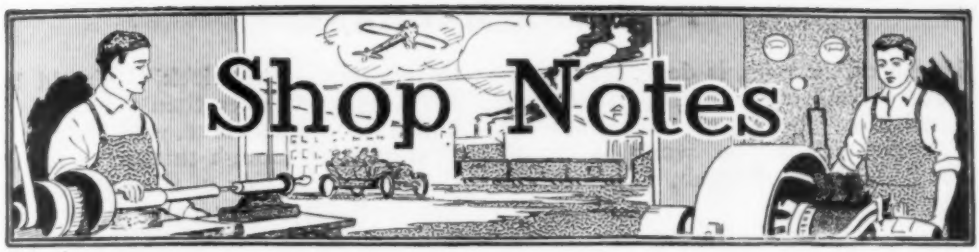
CLAMPS FOR MENDING BURSTED PIPES

Convenient clamps for quickly and effectively mending bursted water, gas, or steam pipes, are now being introduced among hardware stores and plumbing establishments. The clamps are used in pairs and each consists of a semicylindrical piece of metal having lugs on its longitudinal edges, through which bolts may be inserted. A pair of clamps is placed about the defective portion of the pipes to be mended, with packing of rubber or asbestos underneath, after which the two parts are drawn tightly about the pipe by means of nuts and bolts. In case the break is long, two or more pairs can be placed end to end, with the packing so arranged as to form a continuous tight covering.

COMBINATION TOOL FOR ISOMETRIC DRAWING

A combination drawing instrument has been devised which is particularly convenient in laying out hexagonal and other forms according to the isometric system. In it are cut 10 ellipses, and seven hexagons of various sizes, and two right-angle triangles. The instrument itself is a trapezoid having two right angles and measuring 6½ in. long and 5 in. wide. With the curves and angles which it supplies a suprisingly large variety of figures can be drawn at a great saving of time.



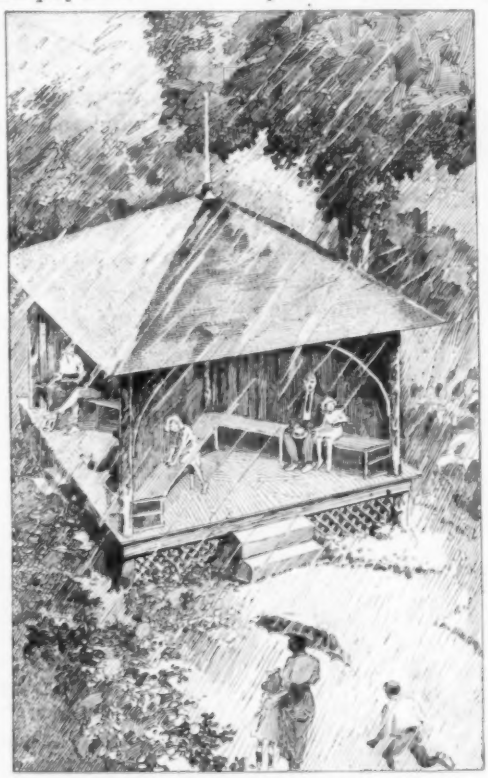


A Rustic Four-Square Shelter House

By H. A. HOOPER

CHIEF among the advantages of the type of square summer house, or shelter, divided by diagonal partitions is the increased seating capacity. Shelter is afforded from the sun and elements under varying conditions in one or more of the sections. Each of the four sides affords entrance to a shelter, and has relative privacy from the adjoining sections. Several houses of this kind were built on a golf course and proved useful and popular.

This construction may be used for houses of various sizes, that shown in the illustration being 16 ft. square, about 30 in. from the ground to the floor, and with 8 ft. corner posts. The height from the lower edge of the roof to the peak is 4 ft., and the eaves have an overhang of 2 ft., giving added protection. Rustic timbers and smaller limbs were used for the structural portions of the house. The supports for the seats and the latticework under the floor were made similarly, of lighter stock. The partitions extend to the height of the eaves, and are supported at their junction by a post. Standard mill stock may, of course, be used throughout the structure, if desired.



This Shelter House Has a Relatively Large Seating Capacity and Affords Added Protection by Reason of the Partitions

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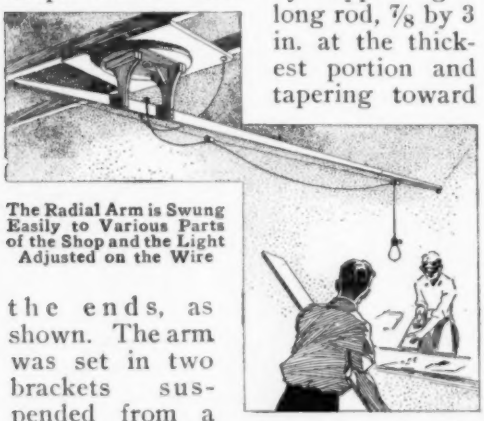
Proper Insulation of Splices

A properly insulated splice should last as long as any portion of the insulation. Apply the tape while the splice is still hot from soldering. Rubber tape should be put on first, to a thickness according to the voltage which is to be carried. Then apply friction tape as firmly as possible, and heavy enough to withstand wear. The tape should extend on the actual insulation at either side of the plug, otherwise there is a tendency for the wire to break at these points. On small work it is advisable to tear the tape into strips of not more than ½ in., for the best finish. A "whipping," made by winding twine tightly and evenly around the splice for the full

length of the tape, is desirable to produce a high-class finish. Insulation varnish, or shellac, should be applied, but not while the work is at all damp.—W. B. Baruch, Charlestown, Massachusetts.

Radial Pivoted Arm for Shop Light

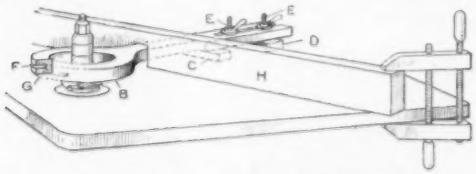
I recently installed a swinging light which reaches nearly all parts of the shop. It was made by supporting a long rod, ⅞ by 3 in. at the thickest portion and tapering toward the ends, as shown. The arm was set in two brackets suspended from a circular turntable, pivoted at the middle on a bolt. The latter was fixed through a square plate which was fastened to the ceiling joists with screws. The cord for the electric light was carried on insulators which slide along a wire fixed to the lower edge of the radial arm.—R. E. Brown, Portland, Ore.



The Radial Arm is Swung Easily to Various Parts of the Shop and the Light Adjusted on the Wire

Safety Spring for the Variety Wood-Molding Machine

The spring shown in the sketch is a safety device, and also satisfactory in preventing vibration, and in holding the face of the work closely against the table top. It is adjustable to various thicknesses. The block C should be about ⅛ in. thicker than the piece to be fed into the machine, while the piece D should be enough thicker to insure that the under side of the head of the spring is practically parallel with the table top when the knives are cutting. The wing nuts E hold the spring firmly in contact with the blocks. The adjusting screws, at E, are threaded into the table.



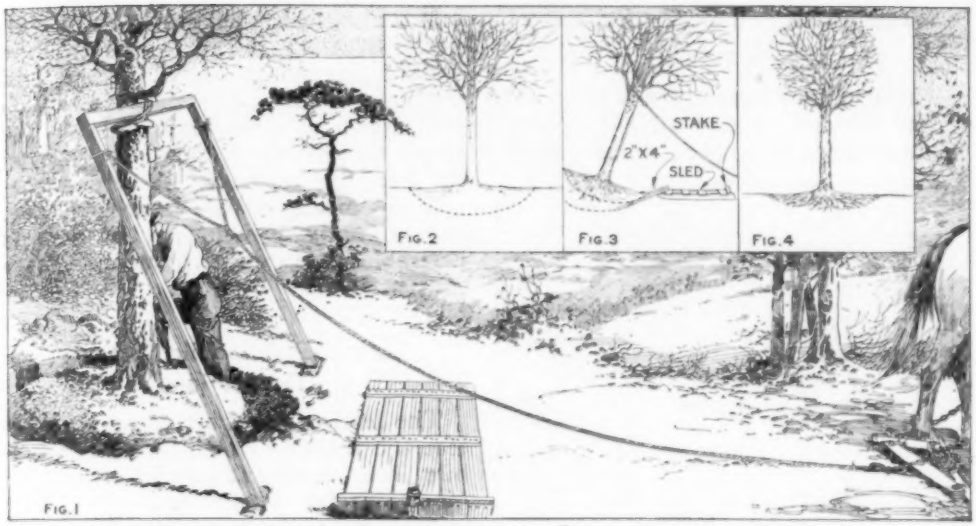
This Safety Spring Reduces Vibration and Is Adjustable to a Variety of Work

The spring B should be made of from 1⅛ to 1⅜-in. hard wood. The diameter of the circular opening is slightly larger than the extreme diameter of the knives. The neck of the spring should be from 2 to 4 in. wide, and must give a firm pressure. End adjustments are made by the slot, at E, extending to the end. A spline, F, is glued into the rim of the spring, as shown in the section, at G, to strengthen the short grain of the wood. The lower side, at G, is rounded to permit the work to enter easily; the inner edge is flat, and the under side of the head is waxed to make feeding easier. For heavy work, the piece H extends from edge to edge of the table, and is clamped at both ends. The groove in H fits the neck closely, but with sufficient play to permit the spring to move vertically without undue friction.—Charles A. King, East Kingston, N. H.

Repairing a Short-Circuited Armature Section

To locate a short-circuited armature section, pass a current from a dry cell, or storage battery, through the armature, using the brushes of the machine. Using a low-reading voltmeter—a millivoltmeter if possible—touch its lead wires to one pair after another of adjacent commutator bars. A zero deflection of the voltmeter indicates a short-circuited section.

It will be noticed, at periodic intervals in passing around the commutator, that the voltmeter deflection reverses, and that just before this transition point the deflection is less than normal. This merely indicates a passage from one pole to another on the



The Use of This Frame Enables One Man with a Team of Horses to Transplant Trees of Considerable Size

winding. On a four-pole armature, for instance, there will be four such reversals of the meter deflection. Switching of lead wires is all that is necessary to make the meter read in the right direction.

If a short circuit is found, clean out the spaces between commutator bars, to be certain no small bits of metal or copper dust are responsible. Failing thus to locate the trouble, carefully lift out the coil connected to the bars to which the short was traced, and repair any breaks in the insulation. Shellac and silk ribbon are the best materials for this work. Apply the ribbon smoothly, coating it thoroughly.

A broken circuit in the winding itself may be located by connecting a battery through an ammeter to two metal strips, held apart by a piece of wood, at such a distance that they will touch adjacent commutator bars. Holding this device against the commutator, turn the armature slowly by hand. A reduced deflection of the ammeter indicates a broken or open-circuited winding. The only resort, in case of open circuit, is to lift out the damaged coil, solder the ends together, reinsulate, and replace the wire in the slots.—K. M. Coggeshall, Webster Groves, Mo.

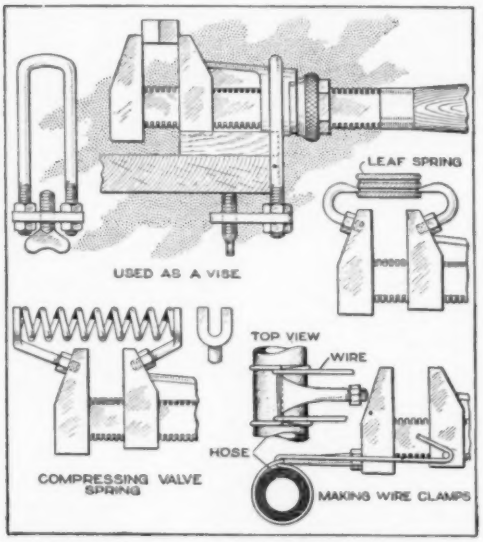
Transplanting Large Trees

Trees of considerable size may be transplanted for shade, or decorative, purposes by one man with a team of horses, by the use of the frame shown in the illustration. It is made of 4 by 4-in. timbers, spiked together. A trench is dug around the tree, and the roots cut free, taking plenty of earth with them, as shown in Fig. 2. To get at the lower roots it is desirable to haul the tree to the position shown in Fig. 3, by means of a guy rope hitched to the team. If the tree is too large to be lifted clear of the ground by means of the frame, it may be skidded to a stoneboat, as indicated in Fig. 3. The frame is lashed to the trunk of the tree, and its lower ends set on blocks. A rope is fixed to it near the top, and the tree may be raised to drop on the stoneboat, by driving the team slowly forward. The frame may be used to set the tree into a pit at its new location, by using the frame in the reverse direction. The tree should be guyed to make it plumb, and the earth filled firmly around it, as shown in Fig. 4.—J. G. Allshouse, Avonmore, Pa.

¶Chalk sandpaper on the back to prevent it from slipping in the hand.

Wrench Adapted Easily for Many Uses

The ordinary monkey wrench, with a few alterations and additions, may be made to serve many purposes other



By the Addition of a Few Simple Attachments the Wrench Is Available for Several New Duties

than that of a wrench and hammer, by utilizing the adjusting feature as a tension screw. It is particularly desirable for automobile purposes, saving both weight and expense. The sketches show a few of the possibilities by providing threaded holes and attachments. If the jaws of the wrench are hardened, it is necessary to anneal them. If the knurled sleeve is not already hexagonal, it is advisable to flatten the sides so as to obtain gripping surface.

An attachment which converts the wrench into a small vise was made as shown. The detachable bracket is provided with a thumbscrew for securing it to the running board of an automobile or other projecting edge. An attachment of 7/16-in. rod for converting the wrench into a valve-spring compressor is shown at the left. Attachments used in separating the leaves of an automobile spring to insert lubricants are shown at the right.

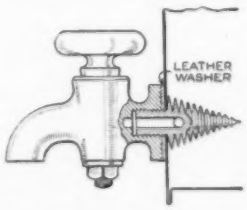
An attachment for the making of wire bands or clamps for radiator hose, bands about buckets, garden-hose connections, etc., is also shown. The sliding jaw has a 3/16-in. hole drilled through it and a pin inserted, which projects about 1/4 in. on either side. The chisel-shaped attachment is grooved for holding the wire. A strong tension by means of the knurled sleeve, before finally drawing up the loop, is desirable.—George A. Luers, Washington, D. C.

Care of Automobile Steering Connections

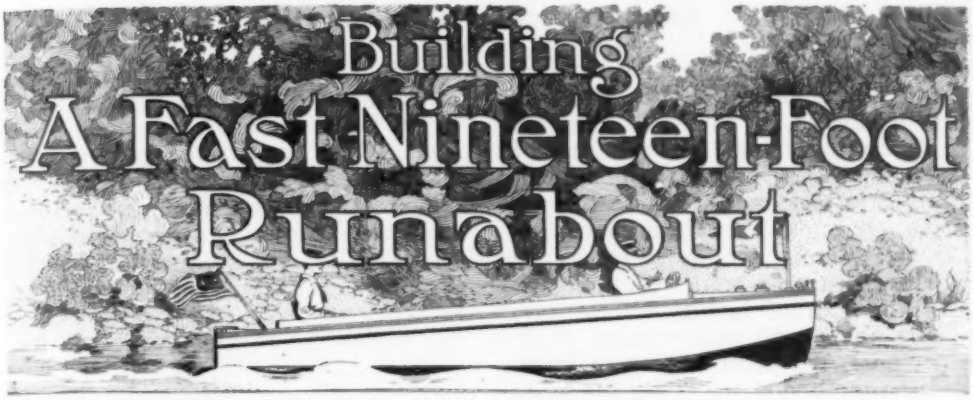
The leather boots necessary to protect the steering joints of an automobile from mud and water should be given careful attention. Old grease should be removed from the joints when necessary, and the boot cleaned. The joints should be greased thoroughly, and a strip of linen, 3 in. wide, used as an inner covering to retain the grease. The boot is placed over this cloth covering, thus keeping it clean for lacing. The inner covering may be discarded when the joint is again greased.—Alexander Bollerer, New Britain, Conn.

Faucet Tap for Large Cans

Oil cans shipped to an undeveloped region were not provided with a suitable tap, and it was found inconvenient to run off the oil from a plugged hole. The faucet tap shown in the sketch was devised, and proved convenient. A tapered screw was fitted to the faucet, and inserted through the end of the can by driving in the point and then turning the faucet until it was set tightly. A leather washer was provided to make a close joint. When the can is emptied, the faucet is quickly removed by unscrewing the threaded point, and may be used repeatedly.—Gus Hansen, Peachland, Can.



Building A Fast Nineteen-Foot Runabout



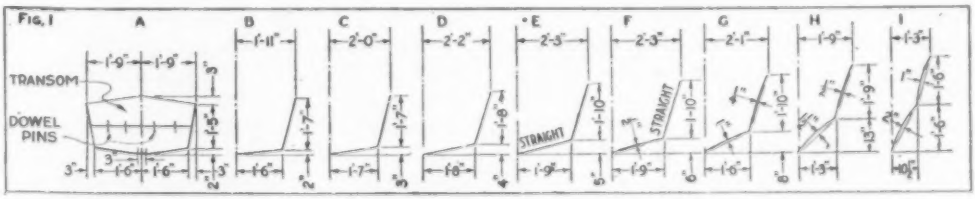
By B. FRANCIS DASHIELL

SEAWORTHINESS in rough water, simplicity and strength of construction, and fair speed with comparatively low power, are features of the small runabout motorboat, shown in the illustrations and detailed in the working drawings. It is of the V-bottom type, and the high, flaring bow enables it to cut the water with slight pounding or spray. A light-weight motor of 4 hp. is satisfactory, and for greater speed one of not over 8 hp. may be installed with a proper margin of safety, and freedom from excessive vibration. The deck plan is shown in Fig. 7 of the page plate; the structural framework in Fig. 6 in plan, and in a vertical section from bow to stern, in Fig. 8.

Before beginning the work of construction Figs. 6, 7, and 8 should be understood, and then full-size paper patterns are made for the frames A to I, as shown in Fig. 1. The diagram for the transom frame A is shown complete, those for the other frames being given in half section only. Make the frames, other than the transom, of 1 by 3-in. straight-grained oak. The two parts of each side section are bolted together with a 1-in. piece, 5 in. wide, called a knee, and the two side sections are joined at the keel by means of bolts and a heel, 1½ in. thick, as shown in Figs. 3 and 5. The fastenings are made with ⅜-in. bolts, fitted with washers and nuts. Inspect the frames to make certain that they are not twisted, and mark them A, B, etc., as indicated.

The stern frame, or transom, shown in Fig. 2, as viewed in section at J-K, Figs. 7 and 8, is made of oak, cypress, or pine, preferably in one piece, and 1½ in. thick. Two boards for it may be doweled, as shown in Fig. 1. Paint the pins and joined edges with marine glue, and clamp the pieces together to dry. Then shape the transom as shown, and fasten 1 by 2-in. oak battens across it, fastening them with screws, as shown in Fig. 2. Fasten 1 by 2-in. oak battens around and ½ in. in from the edges, to provide a suitable nailing strip for the planking.

The keel is a straight-grained piece of oak, or yellow pine, 3 by 4 in. by 18 ft., as shown in Figs. 6 and 8. Lay it out on a suitable level area for the fitting and assembling of the frames. They are notched over it, as shown in



Sectional Diagrams of the Transom and Frames: To be Laid Out Full Size on Paper Patterns, to Which the Pieces are Fitted Accurately

detail in Fig. 5, and bolted into place through the heel. Countersink the bolt heads. Line the frames up perfectly or trouble will be experienced in producing the desired contour and balance in the craft. Where the propeller shaft extends through or near the keel, it is necessary to fix the frames with two bolts straddling the shaft, as detailed in Fig. 3.

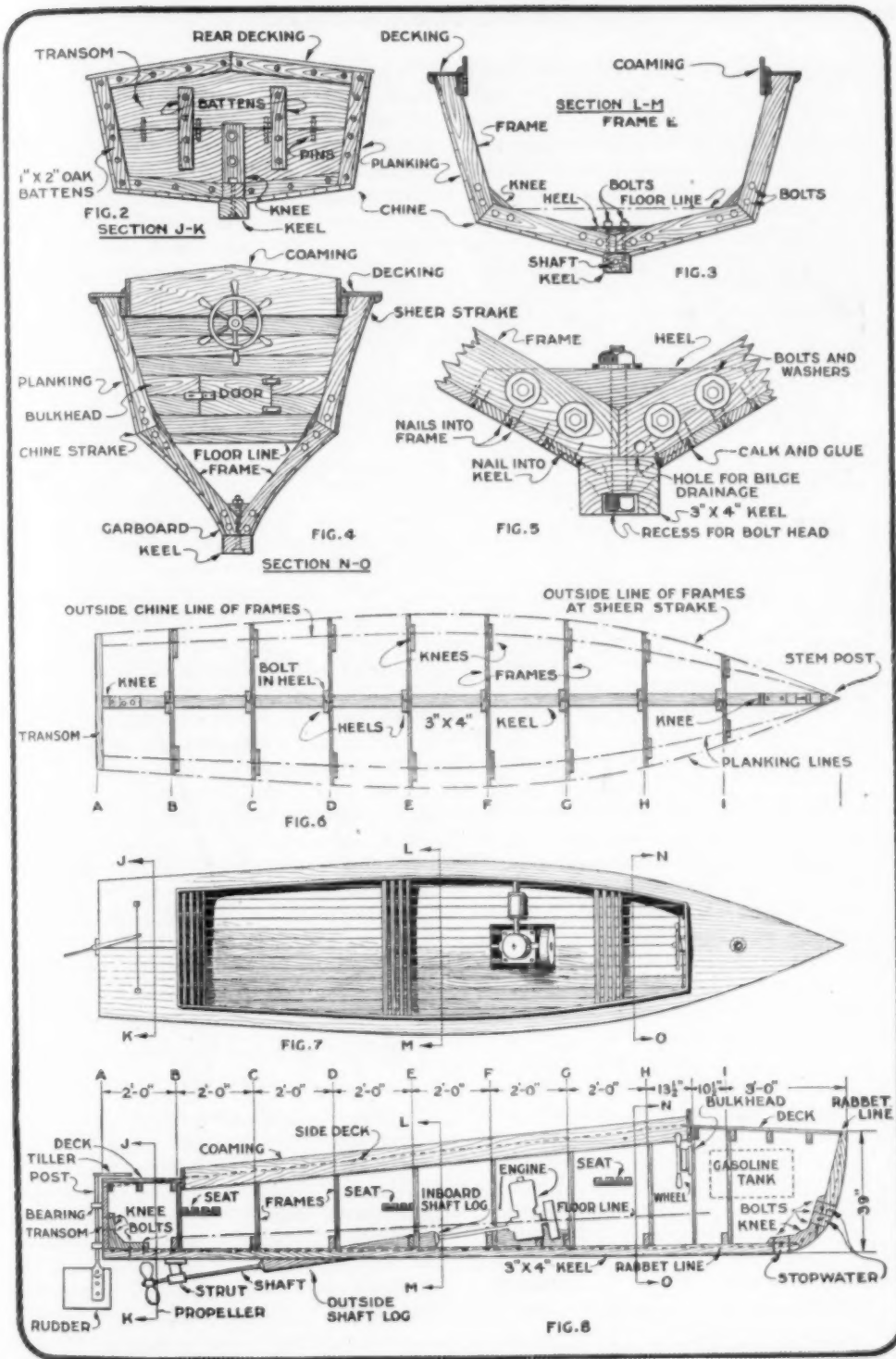
The shape and construction of the stem post, the stem and stern knees, and the method of fastening them into place are shown in Fig. 8, and in detail in Figs. 2 and 9. These parts may often be supplied to the best advantage by dealers in boat stock, in the natural crook, which is most desirable. They may also be built up as shown. To prevent the water from working into the seams of these parts at the joints of the stem and knee, stopwaters are used, as indicated in Fig. 8, and detailed in Fig. 9. They are plugs or dowels of white pine, dipped in marine glue. The stem and knees are bolted to the keel with ½-in. bolts, after painting the joints with glue.

Cut a rabbet, or planking groove, into the stem and stem knee, to provide a suitable nailing support for the planking, as indicated by the dotted line in Fig. 8, and in the stem detail, Fig. 9. Make the rabbet ½ in. deep, to bring the surface of the rabbeted parts flush with that of the planking. The upper corners of the keel are beveled to fit against the garboard, or lower plank, as shown in Fig. 5.

Brace the assembled frame temporarily, and strongly enough to withstand twisting strains. Turn the frame over so that the keel is uppermost, and level it carefully, for the nailing of the planking. The system of planking used is shown in Figs. 2 to 5, and in detail in Fig. 9. The best size for the planks is in lengths of 20 ft. 6 in., so as to give a minimum of end joints. Where short lengths are used, the joints should be supported on blocks on the inside, and the planks butted together. The planking, dressed on both sides, is ½ by 2½ in., though the width may vary slightly, preferably less than this width. Put on the garboard, next to the keel, first, and fit it to the bevel on the keel, as shown in Figs. 4 and 5. Fit the ends of each plank to the transom and into the rabbet at the stem post. The planks are fitted alternately on opposite sides of the hull. Their edges are beveled slightly to form a close fit on the inside, and to provide a space for calking the seams. Nail the garboards into place against the keel by means of wire finishing nails, sunk edgewise through the plank, as shown in Figs. 5 and 9. Fasten the planks to the transom and the stem post with nails or screws, galvanized, or of brass. Fit the planks carefully to the frame. At the chine strake, as indicated in Fig. 4, it may be necessary to trim the sharp corner slightly to produce a good fit for the planks, as shown in the chine detail in Fig. 9. After all of the planks have been put on, plane the top plank, or sheer strake, flush with the upper ends of the frames. Then turn the hull over on its keel, supporting it with braces. The woodwork of the upper portion may now be installed in part.

Notch the frames to receive a 1 by 3-in. filler piece of oak or pine behind the coaming, as shown in Fig. 3 and in the coaming detail, Fig. 9. Make the coaming of ½ by 6-in. oak, fitting the pieces for it into place only temporarily at first. The position of the coaming at the ends of the cockpit is shown in Fig. 8. The side decking is of ½-in. oak, or cypress, fastened with brass screws. Fill in the corners with quarter-round molding, as shown in Fig. 9. The forward and rear decks are of the same material, and are supported on deck beams fixed across the hull, as shown in Fig. 8.

The shaft log and engine bed should then be located. The position of the engine is about 7 ft. aft of the bow. Its exact location will vary with different types and sizes of engines, and should be determined carefully to give the proper stability. The engine is mounted on bed timbers bolted to the frame and keel. The engine shaft is carried in a wooden shaft log, fixed on the inside



This Motorboat Runabout was Designed as a Light Craft of Fair Speed with Low Power. The Construction of the Framework and Other Details Is Comparatively Simple, and Feasible for the Home Mechanic. The General Arrangement of the Framework and Main Working Parts is Shown in Figs. 6 and 8, and the Deck Plan in Fig. 7

and the outside of the keel, as shown in Fig. 8. If desired, the hole through the shaft log may be bored at a mill which may have furnished the keel and other special wooden parts. Metal stuffing boxes are fitted to the ends of the shaft log, and the joint of the shaft log and keel is made water-tight with marine glue or white lead, and bolted, as shown in Fig. 3.

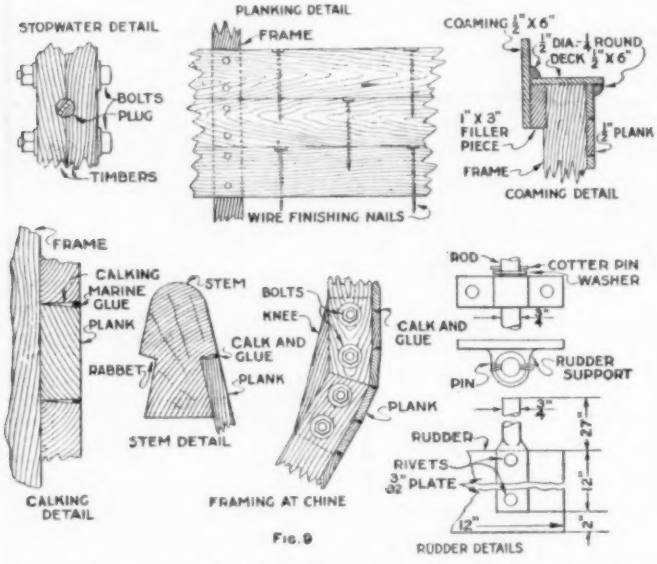


Fig. 9

Details for the Rudder, Coaming, Stopwater Plug, and Other Constructional Features

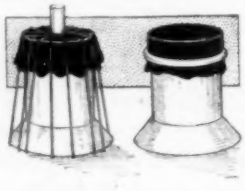
The cockpit is finished with flooring and siding, and bulkheads are built at the stern and the bow. The stern bulkhead is made by paneling the frame B, and the forward bulkhead, by building in a partition, as shown in Fig. 8, and in detail in Fig. 4. The siding for the cockpit is nailed to the frames, and the flooring to 1 by 3-in. floor beams. The seams of the decking are calked with marine glue.

The calking of the hull must be done thoroughly to insure that the craft will be seaworthy. Twisted calking cotton is tamped into the seams, as shown in the calking detail, Fig. 9, by means of a calking iron. The calking is covered with a 1/8-in. layer of black marine glue. Soften the glue by heating it in a water-jacket container, and force it well into the seams, overfilling them slightly. The glue does not become very hard, and when set, the hull should be scraped, removing excess glue. The outside should be given two coats of oil primer, and two of finishing paint. Paint the interior parts also, creosote or asphaltum paint being preferable for this purpose. The cockpit should be painted first with an oil primer and then with a finishing coat. The coaming and decks may be finished with paint or several coats of spar varnish.

The general arrangement of the fittings is shown in Figs. 7 and 8. The metal fittings may best be purchased, but some of them may be made if desired. The location of the gasoline tank in the bow, the seats of wooden strips, the steering wheel, propeller and connections, and the method of fixing the rudder into place, are shown in Fig. 8. A detail of the rudder and its supports is shown in Fig. 9. The rudder is controlled from the wheel by means of wire-reinforced rope extending from a cross arm at the top of the rudder shaft, around the coaming, and through pulleys to the wheel drum.

Making Cupped Leather Piston Washers

Leather washers, cupped to fit the piston of a pump, were required to make a repair, and were made quickly as follows: The pump barrel was 1½ in. in diameter, and the disks were cut ¾ in. larger in diameter. A spool of a diameter two thicknesses of the leather less than 1½ in. was used to form the wash-



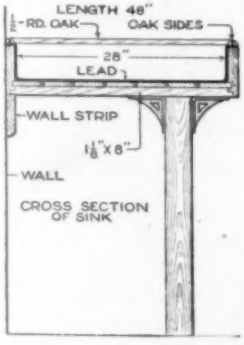
ers, as shown in the sketch. The washer is moistened and tied over the spool, centered with a pencil in putting on the strings, and then placed on the same or another spool with a metal ring or strong cord to hold it, as shown at the right, and permitted to dry into shape.—Herbert Consterdine, Hammond, La.

Ridding a Garage of Automobile Exhaust Gas

The exhaust gas from an automobile proved offensive in a closed garage and the difficulty was remedied by installing a pipe with a hose connection to the exhaust pipe of the car, and connecting it to the chimney. This method can be applied to garages having no chimney by the installation of a suitable flue, or outlet.—J. M. Straughan, Sprague, Wash.

Sink for Washing Blueprints

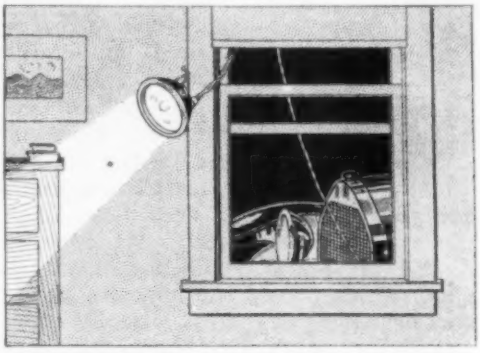
The blueprint sink detailed in the sketch is simple in construction and practical in use. Four pieces, preferably oak, are made for the sides and ends. A groove is planed near the lower edge so that the tongue-and-groove bottom will fit in all the way around. This groove supports the bottom, and provides for shrinkage and expansion, avoiding buckling of the lead lining. Two cross strips are screwed to the under side, and a leg is fastened to each by means of brackets. The lead lining is fitted, and the upper edges turned over, and tacked down. Half-round strips are nailed over the lead, and the woodwork finished as desired.



¶A spool cut at the middle provides two useful knobs.

Headlight as Emergency Lamp for Operating Room

A surgeon found it necessary to perform an operation after dark, in a town where commercial electric light current was unavailable. As an open light should not be used in a room where an anesthetic is administered, the electric headlight of an automobile was made to serve. The car was run up to the window of the room; the reflector and bulb from one of the headlights were removed, and after hanging the reflector over the operating table, the wires were run through the window and connections made. To assure proper results, the system was tested carefully, and it was made certain that the storage battery was fully charged. An extra bulb was provided, in case the one in use should burn out. The light proved quite satisfactory, the reflector shading the eyes of the operators, and concentrating the light on a small area, as desired.—Harry M. Kennard, Charles City, Ia.



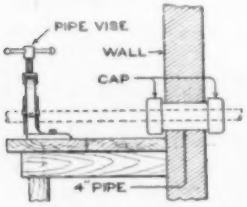
An Emergency Surgical Operation was Performed by the Aid of an Automobile Light

Raising Level of Gasoline in a Blowtorch

When the gasoline level is low in a blowtorch the pressure causes an excess of air in the burner supply pipe, blowing out the flame. In an emergency, a little water poured into the gasoline will cause the latter to float to a high enough level to operate the torch satisfactorily.

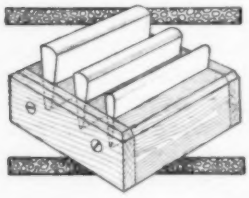
Handling Long Pipes in a Small Shop

Pipes, long rods, and similar pieces, are difficult to handle in a small shop. A 4-in. pipe, fitted through the wall of a small plumber's shop, made it possible to thread pipes of considerable length without bringing them into the shop. The pipes were drawn through the opening in the wall and clamped at one end, as shown. To thread the opposite end it was necessary only to reverse the pipe. When the opening was not in use, its ends were covered with pipe caps.—W. P. Langreich, New York, N. Y.



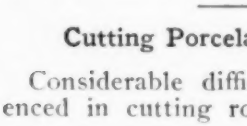
Holder for Slip Stones

Slip stones of good quality are fairly expensive, and easily broken if left to lie about the bench or machine. They may be kept safely and conveniently in a block like that shown. The grooves of several sizes are chiseled into the block, which is as long as the longest stone to be fitted into it. The ends are guarded with strips of wood.—Henry Wedde, Chicago, Ill.



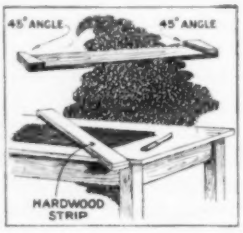
Cutting Porcelain Insulators

Considerable difficulty was experienced in cutting round porcelain insulators used in electrical work. The job was satisfactorily accomplished as follows: A piece of flat, cold-rolled steel, twice as wide as the diameter of the insulators and of the same thickness as the smaller insulators desired, was procured. A small hole, A, was drilled through it, and a slot C cut from the end to the hole, with a hacksaw. The hole B was drilled the same size as the insulators. The latter were then clamped in the hole B, in a vise. With a blow of a hammer on a cold chisel, set on the upper surface of the steel strip, the insulators were cut neatly, and to the proper height, the same as the thickness of the strip. In half an hour, 500 insulators were cut, with only eight damaged ones. Carrying on this method of cutting under water, produced better edges on the insulators.—George N. Garrison, East Orange, N. J.



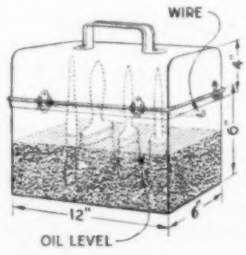
Device for Cutting Tire Fabric on Bias

A wet knife instead of shears is used in cutting tire fabric on the bias in a large plant. A straightedge of hard wood, to which two 45° guide blocks are fastened, reaches across the table, as shown, and is used as a guide in cutting. The straightedge is held at the proper angle by keeping the guide blocks against the edges of the table.



Painter's Brush Preserver and Carrier

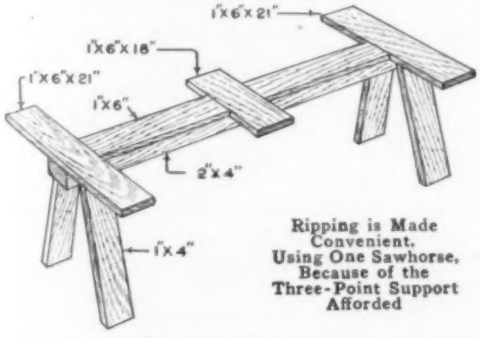
A wood finisher and painter constructed the receptacle shown in the sketch to keep his paintbrushes in good condition, and also for use in carrying them to and from his work. The container is 12 by 6 by 6 in. in size. It is fitted with a raised cover, 4 in. deep, hinged to one side. The cover is built to fit inside the container somewhat like the cover of a dinner pail. Two hooks hold it in place, when being carried by means of a handle. A small hole is bored in the



middle of each end, about 1 in. from the top edge. A stiff wire is passed through the two holes, leaving a little to spare at each end. Holes are bored through the handles of the brushes and the latter strung upon the wire. Sufficient oil or turpentine is poured in to immerse the bristles completely.—L. B. Robbins, Harwich, Mass.

General-Utility Sawhorse

A sawhorse which will serve the purposes that two ordinary sawhorses serve in many instances is shown in the sketch. It may be built quickly of stock timber, and of a size suited to particular needs, the dimensions indicated being suitable for work of average size in carpentry. If desired, the construction may be made more permanent by fastening the pieces together with screws, making housed joints where the legs are fixed to the main piece, and bracing them securely below. A convenient height for the sawhorse is 22 in., and a length of about 8 ft. is satisfactory. The work is supported on this device at three points when ripping, making the frequent shifting of the board to get a solid backing unnecessary. The center board is made shorter than the end pieces, so that it will not interfere in ripping, yet



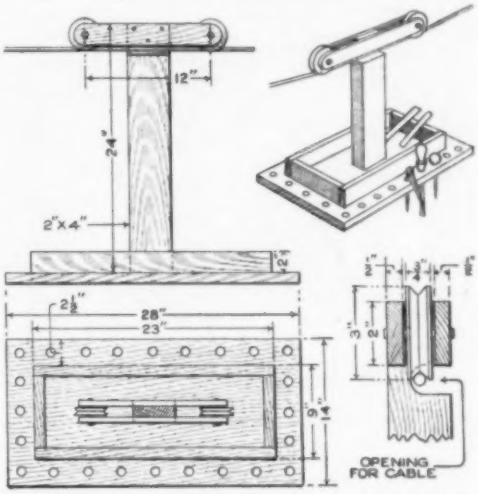
Ripping is Made Convenient, Using One Sawhorse, Because of the Three-Point Support Afforded

give a support at the middle. This is especially handy in ripping long narrow strips.—Harry Simon, Laguna Beach, Calif.

¶Oiling of bearings by an occasional flood of oil is wasteful and inefficient.

Trolley Tool Rack for Shop or Laboratory

A trolley tool rack made up of a tray suspended from a two-wheeled



The Tool Rack and Tray is Moved to the Point Where the Tools are Needed by Shifting It on the Cable

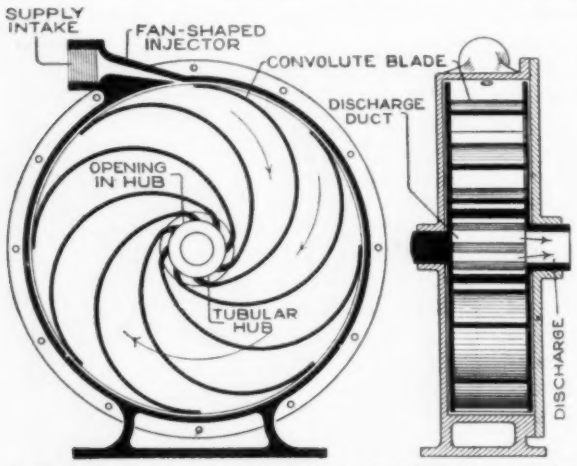
hanger on a rod or stiff wire is convenient in bringing tools to the point where the work in hand is being done. The device may be placed above a long bench or adjacent to a row of machines, and has other uses even in such work as electrical installations. The rack proper consists of a board, ⅞ by 14 by 28 in., around the edge of which holes of various sizes are bored for the tools. A frame, 2 in. high, provides a tray. A piece of 2 by 4-in. stuff supports the tray from the hanger.—R. E. Edward, Seattle, Wash.

Preventing Breaking of Plaster by Door Knobs

A 6-in. square of sheet cork, or composition, of the same thickness as the plaster, may be used, at the point of contact, to prevent the breaking of plastered walls by door knobs when no stops are provided at the floor. This method was used with success in a repair job and the patches of composition board were painted over the same color as the wall.—E. L. Thomas, Pittsburgh, Pa.

An Adhesion and Impulse Engine

The rotary-fan type of power mechanism shown in the illustration was designed and built to apply a moving jet of steam economically to a set of blades, making use of the impulsive force as well as the adhesion of the gas in contact with the peculiarly shaped blades. A jet of steam is forced at high pressure into the chamber from the fan-shaped injector connected to the supply intake. The steam comes into contact with the convolute blades and is carried toward the center of the chamber where the blades converge, passing out into the discharge tube. The curve of the blades is such that the maximum rotary propulsive force is obtained from the steam pressing against them. The device develops a relatively high power on the shaft, the openings through which the steam escapes being designed so that the gas is held in the chamber under sufficient pressure to produce the maximum power, without retaining it long enough to permit condensation.



Steam is Forced from the Injector at High Pressure, and, by Adhesion as Well as Impulse on the Convolute Blades, Relatively High Power is Developed

The chamber is built up of a metal shell, having a circular plate riveted to its open side, and bearings cast as part of the shell and cover, as shown in the sectional view at the right. The injector is fitted in the top of the chamber and is fan-shaped, the width of the chamber. The revolving wheel, housed in the chamber, is of sheet metal and fitted with a solid shaft on the left side, as shown in the sectional view, and a hollow hub, for the discharge of the steam, on the right. Eight convolute blades are fitted between the side plates of the wheel, and openings are provided between them to permit the steam to escape into the hub discharge tube.

The steam enters the chamber under pressure and is forced against the outer edge of the convolute blades, reacting against the curve and being carried toward the hub. I have obtained very high speeds with the device, and this seeming disadvantage was readily overcome by increasing the proportionate size of the wheel. It has given satisfactory results as a water motor, and when the wheel is well under way, and the chamber is filled with water in revolution, the power derived has been found to be large in proportion to the water pressure. This is caused by the centrifugal action of the water, the resulting power being applied largely upon the curved blades rather than upon the inner surface of the chamber.—J. S. Zerbe.

Soapsuds Reduces Carbon Deposit in Compressor

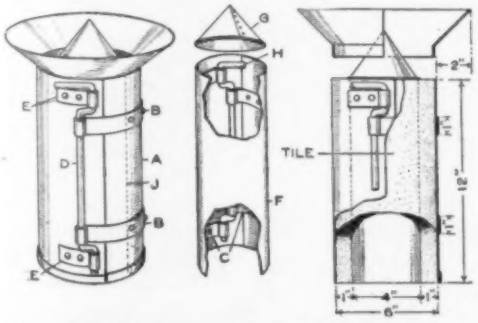
Trouble was experienced with an air compressor, due to the accumulation of carbon in the cylinders, and after several methods for removing it had been tried unsuccessfully the feeding of soapsuds into the cylinders from an oil cup was suggested. While it did not prevent completely the formation of the carbon, the compressor could be run much longer without cleaning, and when it was shut down the deposit was found to be soft and easily removed. The soapsuds were introduced into the cylinder for about one-half hour once a day, and the feed from the oil cups was increased at this time.—T. S. Burns, Elmira, N. Y.

A Homemade Concrete-Tile Machine

I built this tile machine for a farmer who made concrete drain tile in his spare time. The machine may be of various sizes, this one being for tile of 6-in. diameter, 1-in. wall, and 12 in. long. Heavy galvanized sheet iron, 12 by 26 in., was bent to a circular shape, and an internal diameter of 6 in., for the form A. The ends, at J, overlap 2 in. Make two straps, B, ⅛ by 1 by 8 in., and bend eyes for the rod D, of ⅜-in. iron. Make two 4-in. pieces, E, similarly, and rivet both sets to the form A, as shown. Bend the ⅜-in. iron rod D into shape and fasten it to the bands B and E. Make a hopper for the top, completing the outer form A.

Sheet metal, 14 by 12 in., is used for the inner form F, which is 4 in. in outside diameter. Rivet on, as shown, four straps of iron, C, provided with eyes, for the rod H. This rod is arranged so that, when the end H is set as shown, the outside diameter of the core is 4 in., and when released, becomes less. Make a cap, G, used only while filling the mold.

To use the machine, the form A is set on a suitable board, and the core F centered. The latter is then expanded, and the cap and hopper are put on. The concrete mixture is tamped in, the

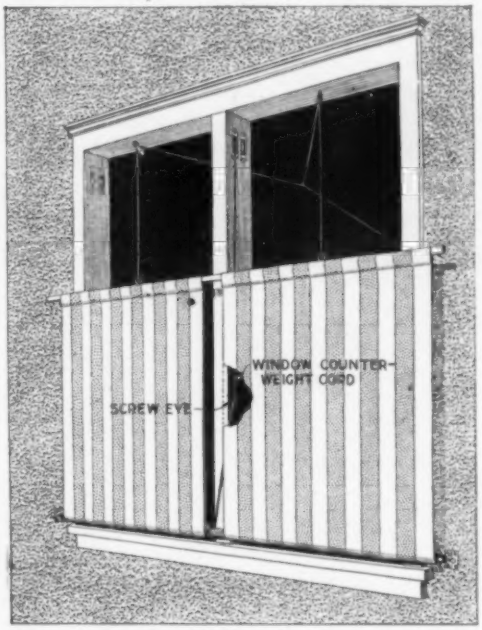


A Farmer Made Concrete Tile for His Land in Spare Time by Means of This Simple Machine

core is released by the handle H, and removed. The form A is taken off by releasing the rod D, leaving the tile on the board to cure.—R. S. Matzen, Fort Collins, Colo.

Weather Curtain for Converted Sleeping Room

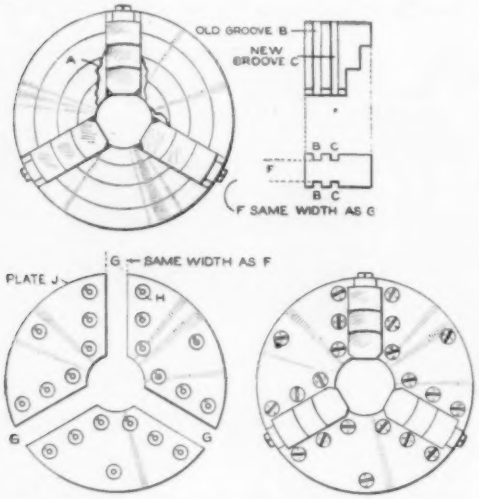
The arrangement shown in the sketch served to convert an ordinary bedchamber into an out-of-door sleeping porch. The windows were removed from their frames to give plenty of fresh air. An awning was necessary to protect the room from the weather and to screen it properly. The awning cloth, pulleys, cord, and bearings for the rod were obtained at an awning store. A curtain pole served to wind the canvas; brass hinge pins, slipped through standard awning sockets and made fast in the ends of the pole, provided excellent bearings for the pole to revolve upon. The problem was to find some means of rerolling the awning automatically and keeping it stretched taut in the wind. To do this, one of the counterweight cords in the window sash was extended, wound around the awning pole in a direction opposite to that of the canvas, and made fast. The awning proved effective and strong.—Jack Bechdolt, Seattle, Wash.



The Curtains are Held Taut and Rolled by the Center Cord Fixed to a Sash Weight

Repairing a Damaged Universal Chuck

A universal lathe chuck was broken, as at A in the illustration, two of the jaws being ineffective. It was thrown



New Grooves were Cut in the Jaws to Fit Plates Fixed to the Face

into the scrap heap, and I repaired it as follows: New grooves, C, were cut on the sides of the jaws of the same size as the old grooves B, the jaws being annealed. A plate of soft steel, to fit groove C, was made of the same diameter as the face of the chuck, and a center hole cut in it. It was drilled, tapped, and counterbored, as at H, at the left, and fastened with screws. Three slots, G, were milled in the plate to correspond with the old guides for the jaws, thus forming the plate J. The jaws were fitted in the grooves G, and the chuck gave good service.—Richard H. Jehlicka, Worcester, Mass.

Making a Loose Wooden Thread Fit Tightly

A loose handle, which was threaded into a mop, was tightened by driving a row of nails around the worn threads so that the fit was snug. The handle could be removed easily, just as if the threads were their original size. Nails with small or rounded heads are best for this purpose.—Charles L. DeCou, Los Angeles, Calif.

The Manipulation of Gold Leaf

An old Pittsburgh sign painter told me how he used to sit on the bows of the river boats and gild the figureheads, with much of his gold leaf blowing away. Finally he thought out this method: After removing the first leaf of gold, and thus exposing the next one, he turned over the paper leaf separating the gold, exposing as much of the gold leaf as he required for use, and, running his forefinger nail along the creased paper, cut the gold, after which he lifted it up on the tip. This is the method used generally today by sign painters, and many others who use gold leaf.

In gilding on glass, it is necessary to size the surface with water size, flowing plenty on until it runs off in quite a stream; onto this the expert swings his leaf, and it lands somewhere on the outlines of the lettering—he is not particular just how accurately, so that the letter is covered; and when he has all the letter spaces covered, with perhaps a great deal of space not included within the letters, he permits it to become dry. The leaf settles down flat on the glass.

There are several brands of gold leaf, grading according to amount of pure gold contained and the intended use. One variety is made expressly for gilding on glass, another for gilding on wood. The difference is mainly in the degree of thinness. One layer of leaf makes a good job on wood, while on glass two layers make a better job than one. For exterior gilding the medium shade of gold leaf does best; the pale-colored leaf contains silver, hence tarnishes from gas or smoke.

Water gilding is that in which the leaf is laid on a size composed of isinglass, or glue and water; oil gilding is done on a size composed of oxidized linseed oil. Water size is for gilding on glass, and oil size for gilding on wood. Oil size may also be used on certain textiles, and other surfaces, just as water sizes are sometimes used in decorative work. Water-size gilding is burnished as soon as the size and

leaf are dry, by rubbing with a wad of raw cotton; the same with oil-size gilding. One book of gold leaf will gild 1½ sq. ft. of surface.

Varnish impairs the luster and color of gold leaf. If varnish must be applied, first coat it with pale shellac.

Gold leaf is injured by dampness and cold. If gilded work is varnished before it is perfectly dry it will show scratches. To avoid this, apply a thin coat of white shellac, which will soon dry, and upon this the coat of varnish may be laid. To remove gold leaf from any part where not desired, as in letter gilding, or lining, use a dampened chamois skin.

In oil-size gilding, if the size is too fresh it will drown the gilding or injure its luster. Better have the size too dry than too wet. If too dry, breathe upon it, which will give sufficient "tack" to the size to hold the leaf.

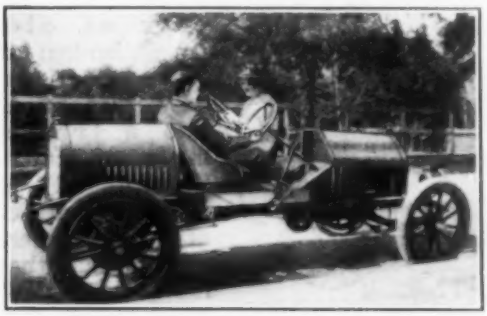
Where two pieces of leaf overlap they will often cause a joint to show, and this may be removed by gently stippling it with the tips of a bristle brush. To prevent laps showing on very smooth surfaces, have the size quite tacky. When gilding becomes dull from gases and smoke, its color may be restored by a weak solution of sulphuric acid.

To gild carved wooden letters, dip them into a thin priming paint, made from white lead and raw linseed oil, with a little drying japan. Then hang them up to dry. When dry, sandpaper smooth, using steel wool for getting into the curves. Next apply a coat of paint thinned out with turpentine and containing a little varnish. When dry, sandpaper lightly to smooth the surfaces and apply another coat of flat paint. When this is dry, apply a coat of shellac, to insure a perfect surface. Use a slow oil size. Then gild, when of the right "tack."

To prevent gold leaf from adhering where not wanted, as when letters of gold are to be made on a painted, or other, surface, a raw potato cut in two, and rubbed over the parts that are to resist the leaf, may be used.—A. Ashmun Kelly, Malvern, Pa.

A Double-Hood Roadster Automobile

A novel automobile which proved very convenient in "trouble shooting" at a garage, and which was also used

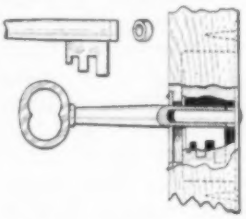


This Car was Dubbed "Automobile Janus" by Reason of Its Two "Faces"

for local advertising purposes, was made by rebuilding a car to have two hoods, seats, and steering columns, as shown in the photograph reproduced. The extra fittings were bought at small cost, and this arrangement provided for the gasoline tank under the rear hood and gave plenty of space for tools, etc. The entire body was painted and striped in orange and black. In towing disabled cars one man faces the car being towed, and can readily inform the driver, if need be.—A. P. Swaidmark, Concord, N. H.

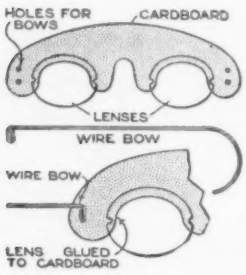
Adjusting Drawer Key to Insure Privacy

Where the locks in a cupboard or similar place are alike, and it is desired to make one of them private, a simple and efficient device is to saw off a piece of the key, about 1/16 in. long. Force this washerlike ring down tight over the post of the lock in the keyhole, as shown. This key will unlock the lock, but when another is tried it will not go far enough into the lock to turn.—Oliver Higgins, Napoleon, Ohio.



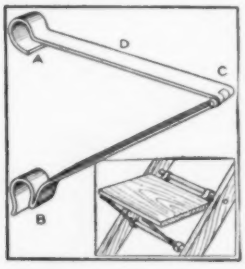
Improvised Frame for Broken Eyeglasses

In an emergency, when a pair of glasses was broken, and it was found difficult to get along without them, a pair of old lenses, broken at the fastenings only, was fitted into a frame made of cardboard. The frame was made of the proper size so that the lenses were centered over the eyes, and the lenses were glued to it. Bows were made of wire and fastened in holes at the ends of the cardboard. This improvised frame gave reasonable satisfaction, in spite of its peculiar appearance.—A. B. Wegener, Madison, N. J.



Folding Bracket for a Ladder

Pails, brushes, or other tools and materials used in working from a ladder, may be supported conveniently on folding brackets like those shown in the sketch. They are hooked to adjoining rungs and a board is fastened across them. When not in use they are folded out of the way, or removed from the ladder. They are made by forming a hinge joint in two strips of iron, as at C. The upper end A and the lower end B are curved to fit the rung without slipping off easily. The upper strip D is drilled to provide a fastening for the shelf.—James E. Noble, Portsmouth, Canada.



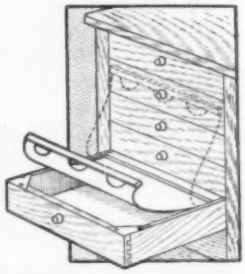
¶A washer placed around the neck of a bottle containing poison marks it effectively.

Small Cutters or Dies Kept on Safety Pins

In the tool-dressing department of a machine shop there are usually many small parts, such as dies and cutters, to be ground. In order to keep the sets together, it was found convenient to place them on large safety pins made of spring-brass wire.—J. R. Minter, Washington, Ind.

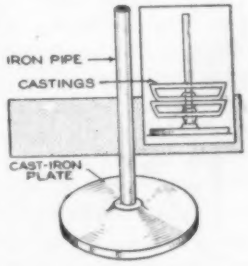
Protective Flap for Drawers of Drawing-File Cabinet

Drawings, tracings, etc., are wrinkled when the drawers of the file cabinet become so filled that the contents catch on the bottom of the next drawer above. The sketch shows how to avoid this by attaching a flap of flexible cardboard, or canvas, as indicated. Bind the front edge with a ½ by ¾-in. strip and provide handholes along it. Metal corner plates prevent the flap corners from lifting when they are tucked in. When selecting a drawing from the drawer, hang the flap on the knob of an upper drawer.



Stand for Stacking Irregular Castings

A stand which prevents breakage of irregular-shaped castings and economizes space is shown in the sketch. It may be made of a size suitable to the castings to be stacked upon it. The base is a plate of cast iron and into it is threaded an iron pipe. A number of pipes may also be arranged on one base.—E. A. Binney, St. Louis, Mo.



Formula for Calculating Automobile Speeds

It is often desired to calculate the speed of an automobile, the engine speed, gear ratio, etc., being known. The formulas ordinarily used are long and involved, with considerable possibility of error. The following formula will make the calculation easier. The abbreviations used are: S, speed of car in miles per hour; s, speed of motor, in revolutions per minute; R, gear ratio; T, diameter of tires on rear wheels, in inches; K, a constant, 336, by which the process is shortened.

Tracing the power from the engine through a known gear ratio, R, the speed of the rear axle will be $R \times s$ revolutions per minute. Each wheel has a circumference of 3.14 multiplied by the diameter, or $3.14 \times T$ in., which is $3.14 \times T \div 12$, if reduced to feet.

The car will be propelled a distance equal to the circumference of the wheels, with each revolution of the rear axle. Thus, to find the distance in feet traveled in a minute, multiply the speed of the rear axle—$R \times s$ revolutions per minute—by the circumference of the wheels—$3.14 \times T \div 12$. To change this rate to miles per hour, before dividing by 12, multiply the result by 60, and also multiply the 12 by 5,280. Reducing this result, it is found that the process may be simplified so that T multiplied by R, multiplied by s, and the result divided by 336, gives the speed in miles per hour. Thus 336 is established as the constant K, for use in shortening the calculation. The formulas, carried through the above process are:

$$S = \frac{60 \times 3.14 \times T \times R \times s}{12 \times 5{,}280} = \frac{T \times R \times s}{336},$$

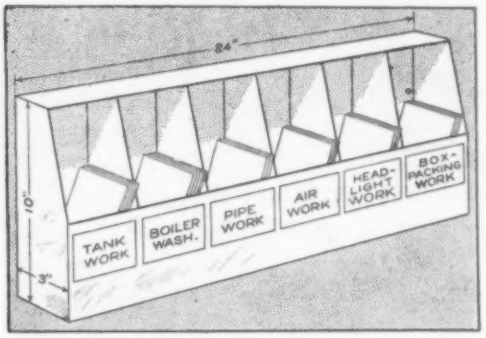
$$\text{or} = \frac{T \times R \times s}{K},$$

as outlined in the detailed process above. — Claude Schuder, Takoma Park, D. C.

¶A bundle of short strings, or cords, bound together can be used as a brush or swab.

Shop-Order Box Saves Time of Workmen

To facilitate the work in a large railroad roundhouse, the jobs for the various workmen were assigned by means of a card system. By placing the cards in an order box, subdivided for the various kinds of work, much time was saved, since the workmen removed the cards from their department files when passing the box, which was situated in a convenient place.



The Workmen Take Their Orders from the Box Instead of Having the Foreman Deliver the Cards to Them

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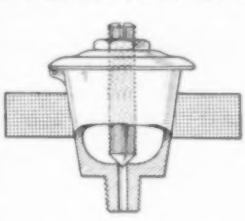
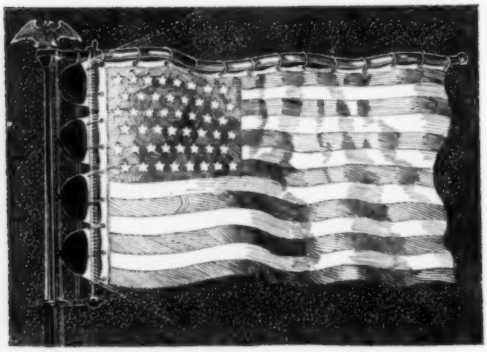
Oil Cups Remodeled to Adjustable Feed

A number of plain oil cups were changed to a satisfactory self-feeding type at little expense as follows: The hinged cap of the oil cup was tapped for a $\frac{5}{16}$-in. cone-pointed setscrew, and a locknut applied to prevent the screw from jarring loose. This screw acted as a needle valve, seating on the edge of the small hole in the bottom. A hole for filling the cup was drilled through the cover, and the latter was then sweated fast. A feed as slow as one drop in ten minutes was obtained, and when once set for its particular purpose, the valve needed no further attention.—D. A. Hampson, Middletown, N. Y.



Illuminated Flag Remains Unfurled

On days when there is only a slight wind blowing it is difficult to make a large flag remain unfurled unless it is

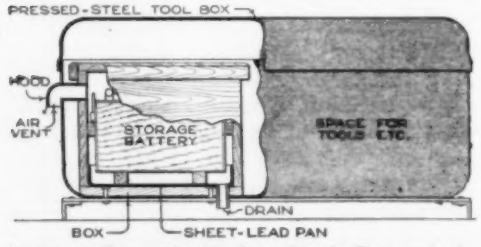


The Flag Remains Unfurled Even in a Light Breeze and is Illuminated at Night

supported. The device shown in the illustration, which is a permanent fixture of the staff, combines this feature with the illumination of the flag. A frame made of a piece of pipe, curved to cause the flag to have the appearance of being blown in a breeze, is supported at the top from the flagstaff. A vertical section is fixed to this and attached to the staff at its lower end by a short piece of pipe. The flag is suspended from the pipe by rings. Shaded lights are arranged along the staff to move with the flag in a change of wind.—L. E. Crane, Hastings, Minn.

Carrying Storage Battery in Tool Box

Motorists are often cautioned against carrying a storage battery in a tool box

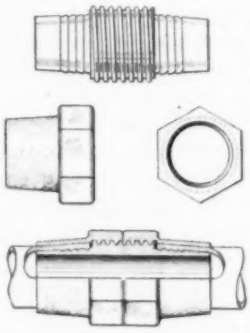


Space was Economized by Incasing the Battery in the Tool Box, without Injury to the Tools

because of its injurious effect on tools, clothes, etc. Sometimes the tool box is most convenient for housing the starting and lighting battery, and this problem was solved as shown in the illustration. A wooden box was made, to hold the battery, having a tight-fitting cover, and painted inside with asphaltum acid-resisting paint. A sheet-lead pan was made to fit the bottom of the box, and provided with a drain pipe of lead, discharging to the ground. A lead-pipe vent passed through the side of the steel case to allow the gases to escape. The wires passed out through rubber packings in the front of the battery box.—Victor W. Pagé, Bristol, Conn.

Positive-Grip Hose Coupling

In order to splice, or mend, various kinds of rubber, or fabric, hose I made the coupling shown in the illustration. The central section is a brass union having corrugations at the end and a threaded portion at the middle. The ends of the hose to be joined are held in place by two caps having a hexagonal nut at one end, the latter threaded to fit the center portion of the union. The caps are slipped over the ends of the hose, which are fitted snugly on the corrugation. By drawing up the cap, a close joint is secured. —E. E. Burnham, Amite City, La.



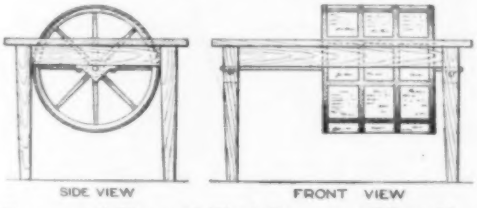
Electric Drier Used in Drafting Room

A portable combination heater and fan, such as is ordinarily used by barbers, was employed successfully for the drying of ink on tracings and drawings, and for drying prints and mounted sheets in a drafting room. This kink saved considerable time in inking drawings, as it was not necessary to wait long for the ink to dry.

Drum in Table Top for Listing Merchandise Sales

A clerk in charge of daily-sales reports found that much time was used in sorting over the twelve forms required, even though cards of different colors were provided. Heavy stock was necessary for the cards because of the wear on them. By the installation of a homemade revolving drum, set in the top of a table as shown, the work was done in one-half the time formerly required, and the cards were discarded in favor of forms printed on thinner paper.

The device was made as follows: Two flat-rimmed wheels were used as the foundation for a drum built up of laths. The drum was mounted on an axle and this in turn supported at its ends in lugs bolted to the framework of the table. The upper portion of the drum was exposed through an opening in the table top, and the blank forms were inserted on the drum, which was covered with several layers of wrapping paper. The drum was revolved easily to get at the various forms to

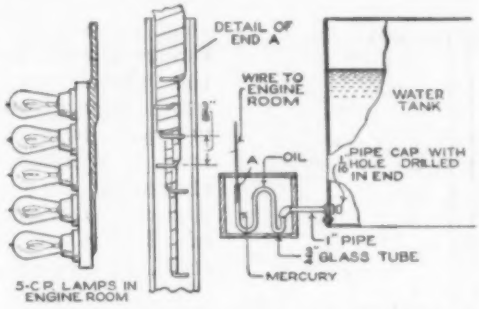


Economy of Time and Blank Forms was Effected by the Use of This Drum, in Listing Sales

which reference was made hundreds of times each day in keeping check on the quantity of stock disposed of.—John P. Lyons, Chicago, Ill.

An Electrical Water Gauge

The house water-supply tank on the twelfth floor of an office building was a source of trouble to the engine crew in the basement, because of its small size, and the variable rate at which the water was used. An electrical indicating device was constructed, as shown, in which the consecutive lighting of 5-cp. lamps, located in the engine room, denoted the water level in the tank in units of 1 ft. The tank was tapped close to the bottom and a piece of 1-in. pipe inserted with locknuts



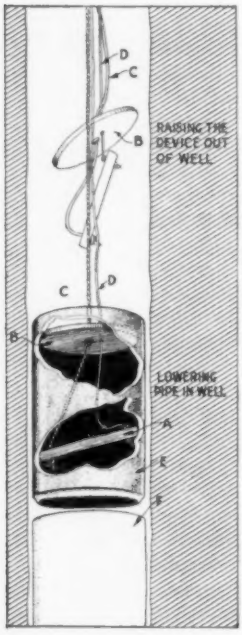
Engineers in the Basement were Enabled to Note the Height of Water in a Tank on the Twelfth Floor by Means of This Device

and rubber washers; an ell and a nipple were placed on the end of the pipe. One end of an S-shaped glass tube was made water-tight in the nipple by means of plaster of Paris. Six wires, taped together, having ½ in. of the insulation removed from the end of each, and bent at right angles, were taped to the other end of the tube. Mercury was then placed in the first bend of the tube, and oil in the second bend. When the device was connected to the tank the resulting water pressure forced the oil into contact with the mercury, balancing a column of mercury against a column of water. The oil provided an insulation between the mercury and the tank, and maintained its position because it is lighter than mercury or water, and mixes with neither.

The contacts for the various lamps were made through the longer wire, which was submerged in the mercury. As the water level became higher in the tank, the mercury was forced to a correspondingly higher position, making contact for the lamps in order. The distance between the wires is ⅜ in. A pipe cap, drilled with a 1/16-in. hole, was placed on the end of the pipe in the tank, to prevent the surge of the water from disturbing the mercury. The glass tube was supported by felt pads in a hinged-cover box.—E. E. Stevenson, Los Angeles, Calif.

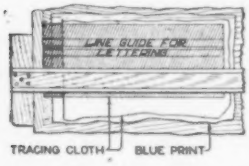
Lowering Concrete Pipes into Well

In replacing a wooden well casing with concrete pipes, 30 in. in diameter, and weighing over 700 lb., the device shown in the sketch was used. The pipes were lowered from a windlass stationed over the well. A piece of 2 by 4-in. stuff, A, was cut slightly longer than the inside diameter of the pipe. A heavy rope was fixed to one end of it, and a lighter rope to the other. A cover, B, was fitted to the pipe and a hole bored at its middle, and the heavy rope passed through it. The smaller rope was passed through a hole adjoining. The board A was wedged into place in the pipe, at the top of the well. The cover B was set into position, with the ropes as shown. The heavy rope was fixed to the windlass. The pipe E was lowered into place, on the pipe F, and the rope D drawn up, releasing the piece A and the cover, which were drawn up for the next pipe.—Arthur E. Shaw, Columbia, S. C.



Line Guide for Lettering

A guide for lettering on tracings, that will aid in making the letters uniform both as to height and slant, can be made easily by ruling a strip of tracing cloth as shown in the sketch. It is inserted under the tracing to be lettered and shifted to various positions as required. An advantage in using a strip of tracing cloth rather than a piece of paper is that the former may be set in relation to a drawing being traced, without obscuring it.—Samuel Kaufman, Philadelphia, Pa.

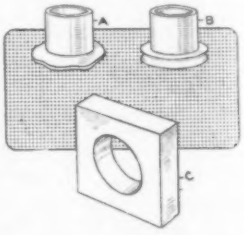


Garden Hose on Rim Makes Ash Can Noiseless

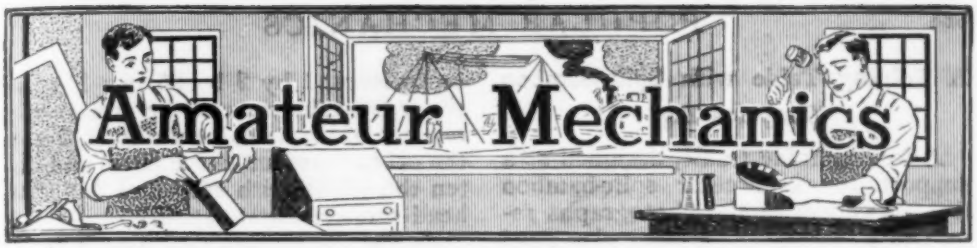
Tenants in an apartment house were annoyed by the removal of metal ash cans in the early morning hours. The janitor took lengths of old garden hose and bolted them around the rims at the bottom of the cans, providing a noiseless pad. When the hose became worn it was replaced.—M. J. Schramm, Ridgewood, N. Y.

Babbitt Collar Overcomes Loose Pump Plunger

In a heating system a vacuum pump was used to return the condensation to the boiler room. It did not give satisfaction, and on inspection it was found that the water had corroded the follower, as at A, to such an extent that the packing had pulled through and worked into the valve seat. Not having a lathe, some other means of repairing the plunger was required, and the following method proved successful: The follower was trued up on an emery wheel and the edge ground concave, as at B. A mold of wood, C, was made the same size as the pump cylinder and of the same thickness as the follower plate. The latter was centered in the mold babbitt was poured around it, and after fitting slightly it has given complete satisfaction.—A. P. Sitton, Fort Stanton, N. M.



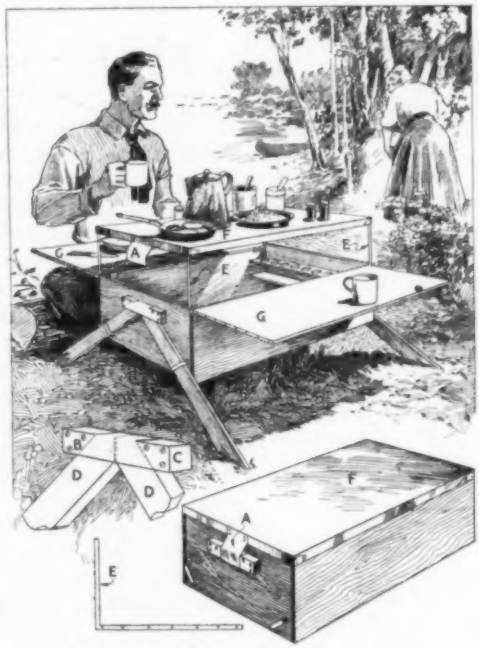
¶The surface of metal to be electroplated should be free from scratches or imperfections, since the plating will not hide them.



Combination Camp-Kitchen Cabinet and Table

By J. D. BOYLAN

THE combination camp-kitchen cabinet and table is the result of not being able to take the members of my family on an outing unless they could have some home conveniences on the trip, and perhaps the sketch and description may help solve the same problem for others. The table will accommodate four persons comfortably, and extra compartments may be added if desired. The cabinet, when closed, is strong and compact, and if well made with a snug-fitting cover, is bug-proof, and the contents will not be injured greatly, even though drenched by rain or a mishap in a craft.



This Outfit Provides Accommodations for Four Persons, and Folds Compactly

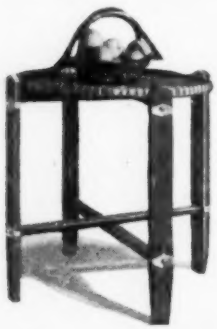
For coffee, tea, sugar, salt, etc., I used small screw-top glass jars. They are set in pocket shelves at both ends. When closed, one can sit on the box or even walk on it if necessary when in the boat, and if an armful or two of coarse marsh grass is spread over it, the contents will keep quite cool, even when out in the hot sun. When open for use, the metal table top F is supported on metal straps, E, which also act as braces and supports for the table leaf, G, on each side of the box. This affords plenty of table surface and one can easily get at the contents of the cabinet while cooking or eating. The legs, D, are stored inside of the box when closed for traveling. They are held in place under metal straps when in use, and held at their upper ends by the metal plate and blocks, B and C. The bent metal pieces, A, on the ends of the top, spring over the blocks at B and C, and form the handles.

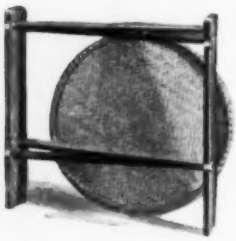
A Homemade Life Buoy

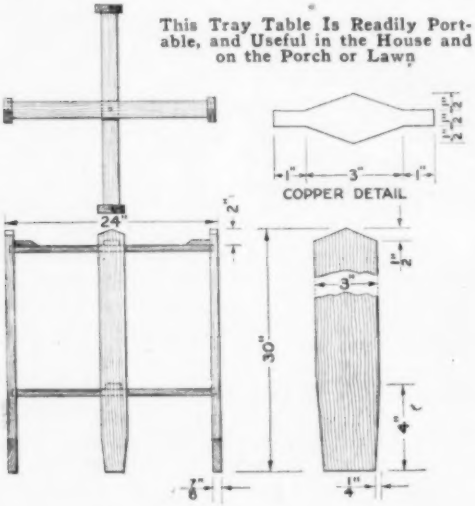
A serviceable circular life buoy may be made by sewing together rings of canvas, filling the resulting form with ground cork, and waterproofing the covering. Cut two disks of canvas about 30 in. in diameter, and cut out a circular portion from the center of each, about 12 in. in diameter. Sew the pieces together at their edges, leaving a small opening at a point on the outer edge. Fill the cover with cork used in packing grapes, and sew up the opening. Paint the buoy thoroughly, with white lead, and attach hand grips of rope.

A Folding Table with Split-Bamboo Tray for Top

A folding table frame, designed as a support for a circular split-bamboo tray, is shown in the photographs reproduced and detailed in the working drawing. It is a serviceable and inexpensive piece of furniture, and can be constructed readily by the home mechanic. As the trays vary in size, the frame must be made to correspond, those from 24 to 28 in. in diameter being satisfactory. The tray may be made by the ambitious craftsman or purchased at stores dealing in Oriental goods. A wooden top may, of course, be substituted. The frame is made







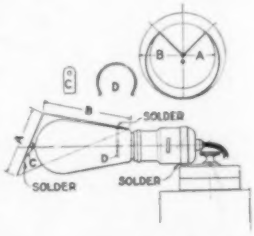
This Tray Table Is Readily Portable, and Useful in the House and on the Porch or Lawn

preferably of soft wood. The following finished pieces are required for a 24-in. tray: 4 legs, ⅞ by 3 by 30 in.; 4 crosspieces, 1 by 2 by 25 in. Mortise the legs to the ends of the crosspieces, one set of mortises being ⅞ in. below the other. Assemble the parts and fasten the joints with glue and 2-in. flathead screws, countersunk.

Adjust the crosspieces of each set so that their centers match, and fasten them in this position with screws, from the under side. The two parts of the frame revolve on them when the table is "knocked down." On the ends of the lower crosspieces of each set, fasten blocks to level the support for the tray. Finish the frame to harmonize with the furniture of the room. Conceal the screw heads under bands of hammered or oxidized copper, fastened with copper or brass pins. A second tray may be placed on the lower crosspieces.—F. E. Tuck, Nevada City, Calif.

Small Desk Lamp Supported by Paper Weight

Those who wish a small desk light that may be pushed back out of the way in the daytime, will find the accompanying sketch of interest. When in use on a roll-top desk, the lamp is placed on top near the edge, so that the bulb overhangs. A 25-watt lamp will light the bed of the desk, and the small metal shade is so placed that no part of the bulb is visible to the eye of the worker. By providing a suitable base, the lamp may be adapted to other uses. A stock paper weight, about 2 in. in diameter and covered with green felt, was used as a base. An ordinary drop-cord socket is provided, and to one side of the top cap a strip of brass, 1/16 by ½ in., is soldered. A hole is drilled near the end of this strip so that the screw which holds the knob will also hold the socket. Connect the flexible cord in the usual manner.

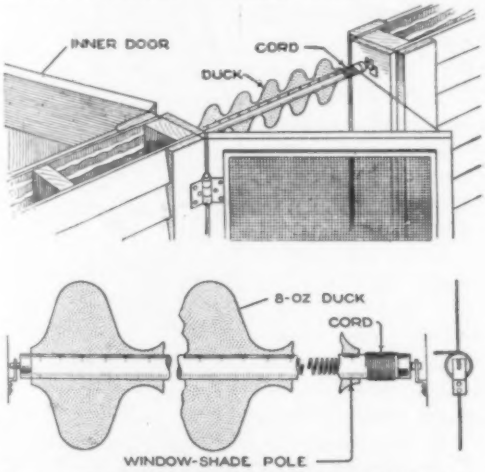


The shade is made of sheet metal,

bent in the form of a cone, having the front shorter than the opposite edge. Make a sketch of the bulb, and determine the lengths of the two sides A and B, and then draw two concentric circles of corresponding radii on paper, as indicated in the small diagram. The proper curve for the shade will then lie between these two circles. Cut a paper pattern, and form it into a cone. After the proper shape is determined, mark it on the metal, cut it to shape, and solder it. A small spring clip, C, engages the tip of the bulb; the back of the shade is held by a piece of spring wire, D. It is easy to spring the shade off in replacing the bulb. The outside of the shade should be enameled an olive-green.—John D. Adams, Phoenix, Arizona.

Device Frightens Flies at Screen Door

An effective means of frightening flies away from a screen door may be made from a spring curtain rod and cotton duck. Scallops of 8-oz. duck, 6 in. long, are fastened to the pole, on opposite sides, as shown. The ratchet on the end of the pole is arranged so as not to catch. A small cord is wound

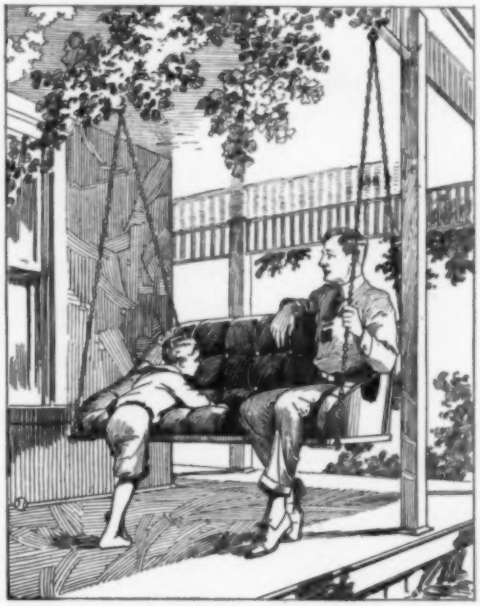


The Scalloped Roller is Revolved Rapidly When the Door is Opened, Frightening Flies

around the pole and fastened to the screen door. The rod supports are fixed near the top of the door frame.—Josef H. Noyes, Paris, Tex.

Porch Swing Made from Automobile Seat

When an obsolete type of automobile was converted into a truck for



The Seat Discarded from a Rebuilt Car was Put to Good Use

marketing purposes, a leather-upholstered seat, discarded, was utilized as an attractive and comfortable porch swing. Hooks were secured to the front corners of the seat and to the upper edge of the back, for the chains attached to suitable supports.—George L. Ayers, Washington, D. C.

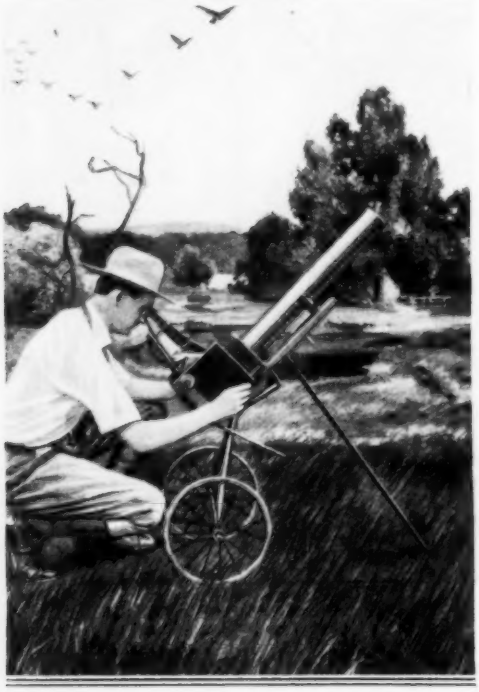
Linoleum Panels for a Homemade Chest

A strong packing box was converted into a useful and not unsightly chest by covering it with panels of linoleum left over from a job of covering a floor. Strips, ½ by 2 in. wide, were nailed around the corners of the box to form a panel on the top, sides, and ends. The wood and the linoleum were shellacked, and made a good appearance.

¶The lower corner of an envelope may be used as a small funnel.

Camera for Bird Photography

A reasonably large image must be obtained in photographing bird life, or the details of plumage and identification are lost, reducing the value of the pictures. The "gun camera" shown in the photograph was devised for this purpose, and with it exposures may be made more quickly than with the telephoto type of camera, a feature of great value in this class of photography. The device consists of an ordinary reflecting-type camera, mounted on a carriage for ready portability and quick adjustment. The bellows is supplemented with a tube, permitting the use of lenses of upward of 30-in. extreme focus. This gives a larger image without loss in speed. A ¼-in. image of a bird was obtained with a 7½-in. extreme-focus lens, as against a 2-in. image with one of 30-in. focus, from the same position. The lens is set near the rear end of the tube, giving a deep hood for shading the sunlight. Lenses of an old type, known as "Long Toms," were used. They are inexpensive compared with newer types with iris diaphragms, and give good results even at 1/1,000 exposures.—Arthur Farland, New Orleans, La.



Bird Images Large Enough to Show Identification Markings are Obtained with This Camera

Electric Fan an Aid to Heating Room

The electric fan is useful not only for cooling the air in summer, but also for distributing the warm air to advantage in the winter. An efficient way of warming a room fairly uniformly is to place an electric fan near a radiator, so that its breeze passes through the heating coils, or near another source of heat. The heat is circulated around the room, instead of being kept in a limited area.—Peter J. M. Clute, Schenectady, N. Y.

Cat-and-Bells Scarecrow

A scarecrow resembling a living animal is often more effective than other devices, and the cat-and-bells arrangement shown in the sketch was found especially so. The hide of a cat was stretched over a hollow frame and suspended by a cord from a large weather vane. Several bells were attached to the cord, and when the vane shifts in the wind, the movement of the hide and the rattling of the bells combine to frighten the birds.—F. H. Sweet, Waynesboro, Va.

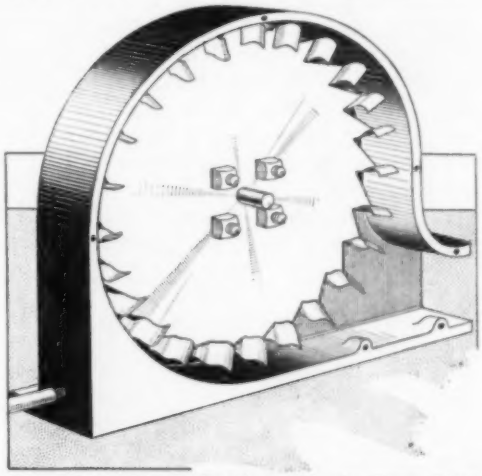
¶A coating of five parts of coal tar, one part gasoline, and one part japan drier will make canvas nearly watertight.

A Small Hydraulic Turbine

By FRANK D. BELL

CONSIDERABLE power and speed can be developed under ordinary water-supply pressure by the turbine, or water motor, shown in the sketch and detailed in the working drawings. The parts are of simple construction, and the machine may be assembled or taken down easily. It is useful for either belt or direct connection to electrical generators, small machines, etc., the direct connection being preferable for a generator. The wheel is built up of sheet metal and provided with curved buckets set in the saw-tooth edge. The water is admitted through an opening in the lower part of the housing and passes out at the opposite end into a suitable drain pipe. The housing is made of two sections, the main casting and a cover plate. Bearings for the shaft are cast into the housing, which is reinforced on the back by ribs radiating from the center.

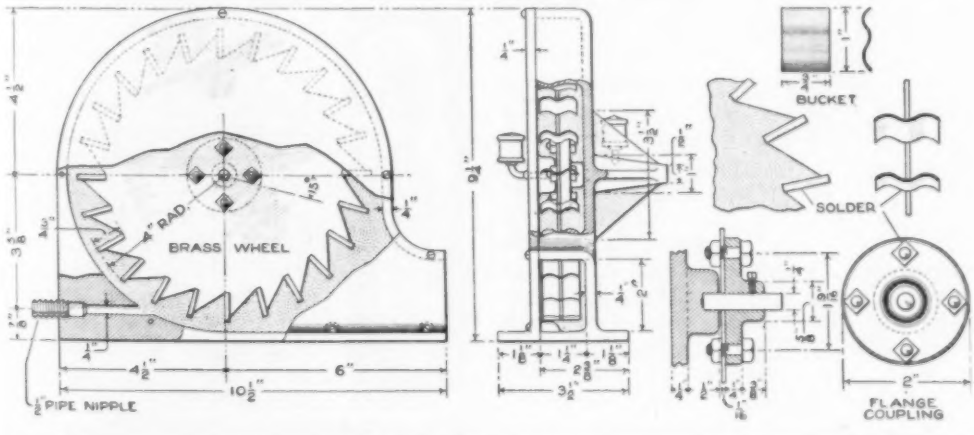
Wooden patterns are made for the housing, the main casting and the cover plate being cast separately. The pattern for the cover plate should provide for the bearing lug, as shown in the sectional detail, and for the angle forming a support at the bottom. Special attention should be given to allowance for proper draft in making the pattern for the main casting; that is, the edges of the reinforcing ribs, and the sides of the shell should be tapered slightly to make removal from the sand convenient. The advice of a patternmaker



View of the Water Turbine with the Cover Plate Removed, Showing Inlet and Drain

will be helpful to one inexperienced in this work, although many machine metalworkers are familiar with the process.

The finishing and machining of the parts and their assembling should be undertaken as follows: Clean the castings and file off rough parts. Smooth the cover plate and the shell to a close



Details of a Water Turbine That will Give Considerable Power and Speed for Driving a Generator or Small Machine

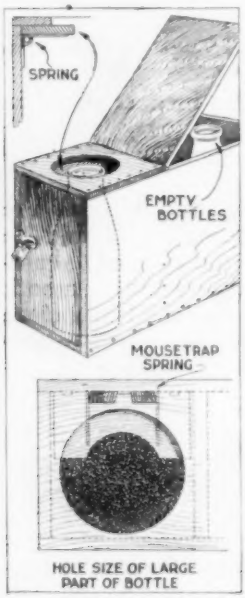
fit, and drill and tap the fastening holes for 8-32 machine screws. Drill ¼-in. holes for the bearings, through the bearing arm and ¼ in. into the lug on the cover plate. Drill and tap the two grease-cup holes for ⅛-in. pipe thread. Drill the nozzle hole ¼ in., and drill and tap it for a ½-in. pipe nipple.

Lay out the wheel of 1/16-in. brass, making 24 notches in its edge. Fasten the wheel to the ¼-in. shaft with a flanged coupling, fixing it with a set-screw. Bolt the flange to the wheel with 8-32 steel bolts. Make the buckets of 1/32-in. sheet brass, curved as detailed, and round off the edges. Solder them into place, using plenty of solder and making certain that the curve is set properly. Place drops of solder on the flange nuts to secure them. Place the ends of the shaft on two knife-edges, and balance the wheel by adding drops of solder to the lighter side. This is very important, as undue vibration from lack of balance will wear the bearings quickly.

Assemble the machine, using shellac between the cover plate and shell. Make connection to the water supply with a ½-in. pipe. Bolt the machine down, and do not let it run at full speed without load.

Automatic Lock Box for Milk Bottles

A mousetrap spring, provided with a suitable catch, was fitted into a box for milk bottles, and served to protect the milk bottle against theft by prowlers. The box was made large enough to hold several bottles, the empty ones in one portion and the filled bottles in another. The bottle is dropped through an opening in the locked end of the box and the spring forces up the catch. While this device may be tampered with, it guards effectively against the theft of bottles of milk, since most of those stolen are taken because they are easily accessible.—L. F. Head, Seattle, Wash.



¶The oxyacetylene flame may be used in cutting or welding steel cables, but such welds will not sustain the original safe load of the cable.

Uses for an Old Toothbrush

A discarded toothbrush, properly cleaned so as not to be insanitary, may be used in one or possibly more of the following ways: to raise the nap of white buckskin shoes, after polishing them; in reaching corners with shoe polish, or in cleaning out eyelets and corners; cleaning typewriter keys with benzine; polishing small parts of metalwork.—Joseph A. Cunningham, Philadelphia, Pa.

A Locking Sheath for Hunter's Knife

Having made a hunting knife and desiring a suitable sheath for it, I devised that shown in the sketch, which has the special feature that the guard on the knife handle locks in slots cut through the sheath. Two pieces of leather were used, one for the back section and the other for the shorter front piece. The sewing at the edges of the two sections extends from the level of the slots around the lower end of the sheath. Two slots were cut vertically through the upper portion of the sheath, which is fastened to the belt of the wearer, as indicated.—George H. Flint, Harrison, Me

Discarded Buggy Springs for Diving Board

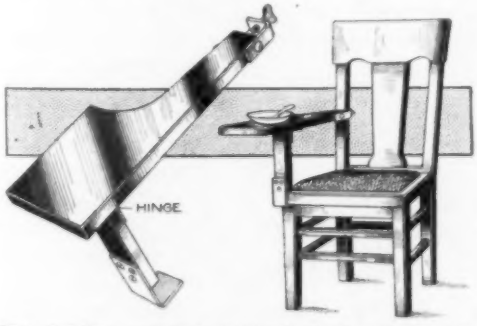
Old leaf springs obtained from a buggy were used to give the necessary spring to a diving board. One of the springs was set at each side of the board about 2½ ft. from the fixed end, and they were joined by a cross support of 2 by 4-in. wood, on which the spring board rested. Straps to check the strain on the springs from the rebound were provided.

Water Wheel Turns Spit over Campfire

When a camp fire is placed near a stream, water power may be utilized to turn the spit in roasting meat over the fire. The rod, on which the roast is suspended, should be extended, and supported at one end, over the water. A small paddle wheel may then be rigged up easily on the rod.

A Detachable Chair Arm

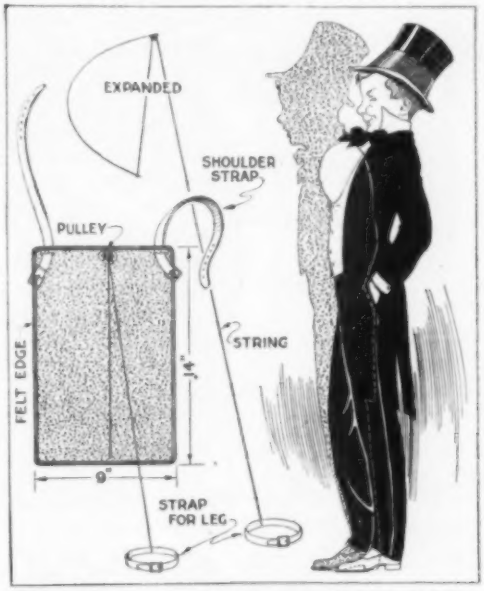
The children in the home as well as others can make good use of a chair arm which may be attached quickly to an ordinary chair. The wide arm is clamped to the back of the chair by means of a strip of metal fitted with a thumbscrew, and the upright is fixed to the arm by a hinge, making it convenient to store the device. The lower end of the upright is fitted with a metal angle which fits on the corner of the chair.—J. F. Long, Springfield, Mo.



This Folding and Detachable Chair Arm Is Useful in the Home

Comic Chest Expander for Play or Stage Use

A device used in an amateur vaudeville sketch with good effect, and which is interesting for play purposes, was made of a 1/32 by 9 by 14-in. piece of sheet spring brass, rigged as shown. In the center, near the upper edge, a small pulley was soldered, and at the center of the bottom edge a small hole was drilled. In it was fastened one end of a 4-ft. string which ran up through the pulley. The other end was fastened to a strap to fit around the leg just above the knee. At the two upper corners of the brass sheet two slots were cut to accommodate similar straps, as fastenings. When the wearer stands in a normal position the chest is as usual, but by straightening the body and slightly moving the strapped leg back, the brass sheet is bowed outward, giving the appearance indicated.—Arthur L. Kaser, South Bend, Ind.

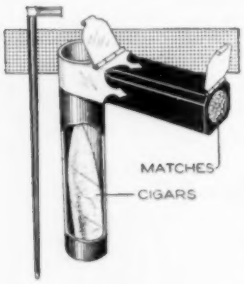


The Performer's Chest "Swells with Pride" When He Draws on the String by Shifting His Position

¶Square cardboard disks fastened to the ends of a spool with thumb tacks will prevent it from rolling.

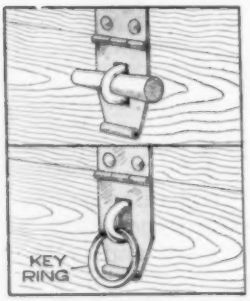
Cane Made of Tubing Contains Cigars

As a novelty in canes, a steel tube was provided with a suitable handle and used as a container for cigars and matches. The tube was fitted with a metal cap at its junction with the handle and the cigars are inserted or removed at this point. The end of the handle was bored out and also provided with a cover, as a match safe. The tube was enameled and varnished to resemble wood.—James E. Noble, Toronto, Canada.



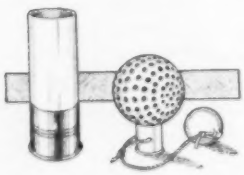
Key Ring Used as a Cover Fastener

The usual box-cover fastener in the form of a staple and hasp can be fastened quite securely, and much better than with the use of a wood pin, by applying a key ring to the staple. This is to take the place temporarily in case the lock is lost or discarded.—James M. Kane, Doylestown, Pa.



Golf Tee Made of a Shotgun Shell

Instead of making golf tees in the usual manner I used the brass end of a shotgun shell, weighted with a small iron ball attached to a string. The device was made as an experiment and proved so useful and convenient to carry that I continued to use it.—Edward Beasley, Texarkana, Ark.

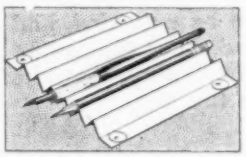


Patching Canvas Bottom of a Canoe

A patch of silk, properly applied, makes a good repair for a hole worn through the canvas bottom of a canoe. Loosen the canvas for about 2 in. around the hole and apply thick shellac. Insert a piece of silk in the hole to lap under the edges of the canvas. Permit the shellac to dry slightly and smooth down the patch. Protect the joint further with white lead, smoothing over the patch and painting it when dry.

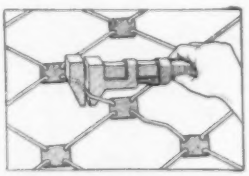
Handy Tray for Pencils and Penholders

A piece of light cardboard, or sheet metal, may be folded into a neat and useful holder for pens, pencils, etc., on the desk or drafting table. In the latter case a piece of stiff drawing paper, folded into V-grooves and tacked to the board, is convenient. For use on a finished surface the folded piece should be pasted on cardboard or otherwise fastened down.—William Robert, Springfield, Mass.



Removing Sag from Couch Spring

A couch spring of the type shown in the sketch sagged considerably, making it ineffective. The sag was taken up by bending the sections of wire with a monkey wrench, so that the entire spring was stiffened almost as satisfactorily as when new. Care must be taken that the wires are bent uniformly so that the strain is evenly distributed.



¶An eggshell may be balanced on the edge of a knife if the egg is "blown," and then partly filled with sand.

An Effective Combination Lock Easily Made

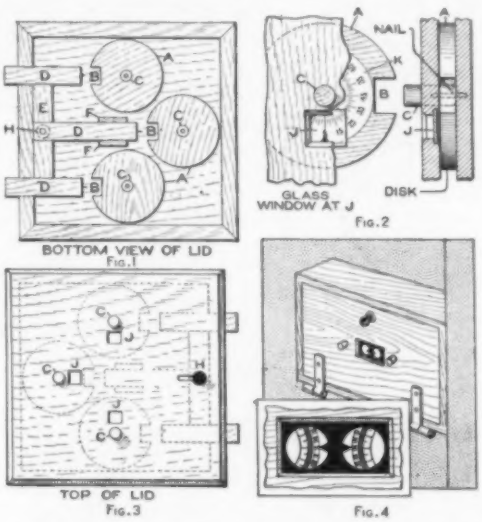
By E. F. STRONG

THE combination lock described has been used for years on lockers and letter boxes in a large public building. The details of a lock with three disks are given, and in Fig. 4 the use of two disks is suggested. The lock is made as follows: From a piece of 3/16 or 1/4-in. hard wood, saw out three disks, A, Fig. 1, from 1 to 4 in. in diameter, according to the size of lock desired. For one with 2-in. disks, as shown, cut slots, B, 1/2 in. wide and deep, in the edge of the disks. For axles use 3/8 by 2-in. hardwood dowels, C, with a six-penny headless wire nail in one end, leaving about 1/4 in. of it exposed.

The case of the lock is shown in Fig. 1. It is made large enough to mount the disks, as shown. Around the edges of the inside surface of the lid fasten strips a trifle thicker than the disks. Place the disks in the positions shown, drilling small holes in the baseboard for the nail axles. The bolts, D, and the piece, E, are made of hard wood, fastened with a lap joint. On each side of the bar, D, fasten cleats, F, to hold it in position. The handle, H, moves in a slot in the lid, and is fixed to the bar, E.

The door, or lid, on which the lock is to be used, is provided with openings, J, as shown in Fig. 3. The axles C, project through openings, as bearings. When the windows J, through which the combinations are read, are made, place the ends of the bolts in the slots of the disks and screw the lock in position. Mark on each disk the point exactly in the center of the window, enabling one to work the combination temporarily. To lock the device, push the handle to the left and turn the axles. To unlock it, turn the axles until the pencil marks appear in the middle of the windows, and throw the bolts.

Next make paper dials, K, of a diameter as shown in Fig. 2. Divide the circumference into from 50 to 100 equal parts, according to the size of the dial, and draw radii, as shown.



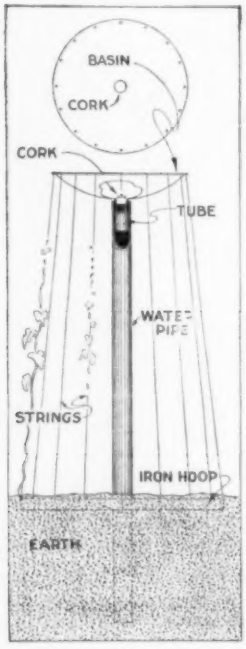
This Wooden Combination Lock Gives Good Service and is Easily Made

Number at least every fifth point. To the face of each disk, A, with small thumb tacks, fasten one of the dials, placing the combination numbers selected exactly over the pencil marks made in setting the temporary combination. Verify the combination before locking it. Unless the slots in the disks are a little wider than the ends of the bolts, the combination must be very closely adjusted. An aid in setting the combination is a line on the glass or a point of black paper, as shown in Fig. 2. The combination may be changed by setting the dials in new positions. The large number of combinations possible makes it very difficult to obtain the combination. For most purposes, two disks are sufficient in a lock of this kind.

¶A convenient method of supporting a garden-hose nozzle is to tie a loose knot in the end of the hose, arranging the nozzle to spray as desired.

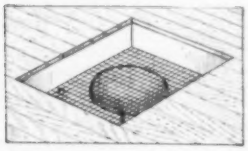
A Simple Metal Bird Basin

A bird basin can be made an attractive feature of a home garden, and that shown in the illustration was made easily of a metal basin and a section of iron pipe. The pipe was sunk in the ground to a depth of 30 in. and loose rock placed around the end of it. A shallow pan, hammered out of a flat piece of sheet metal and provided with a cork stopper, was fixed to the upper end of the pipe. Holes were made in the edge of the pan and strings to support morning-glories were attached from them to a hoop, set in the ground around the pipe. When it is desired to change the water in the pan it is drained off by releasing the cork.—Mrs. F. D. Reynolds, Stevens Point, Wis.



Catch-All Screen inside Hot-Air Register

In order to recover small articles dropped through the floor-register grating of a hot-air heating system without the necessity of removing a section of the pipe, mesh gratings like that shown were fitted into place. Number six gauge wire mesh was used in pieces just large enough to fit into the metal box below the register. Access to the screen may be had by removing the grating.—F. M. Ball, St. Louis, Mo.

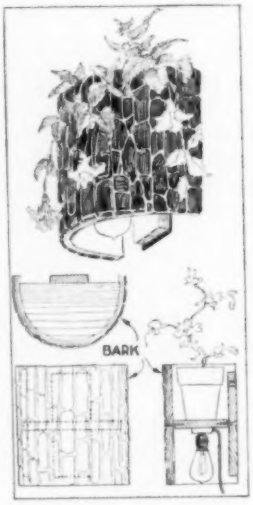


Practical Uses for Old Button Clasps

Leather and metal-button clasps from suspenders are useful in repairing heavy gloves, large leather cases, and other articles on which the clasps have been lost or worn out. They may be sewed or riveted into place. Attached to straps, they are useful means of making a fastening, and may be applied to leggings, and other parts of outing clothes.

Bark-Covered Porch Light and Plant Shelf

A combination flowerpot holder and reading lamp was made from two pieces of wood, bark, and a lamp socket, and proved to be a good shaded reading light. With a plant in the flowerpot, the fixture was made quite attractive by day. Maple bark, well dried out, was used. A piece of board, ¾ in. thick, was cut to fit the curve of the bark, and fastened to it. The former was then nailed to another board, ½ by 5 by 14 in., which formed the support for the fixture. A lamp socket was attached and a suitable current source provided.

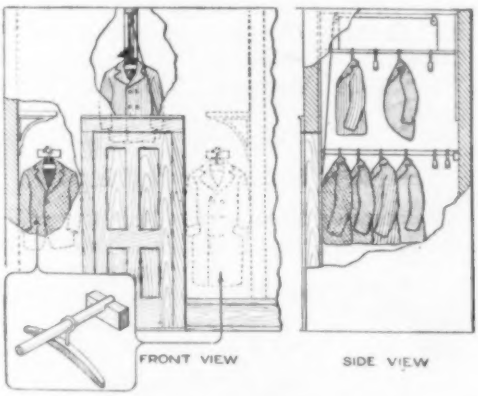


Removable Headrest for Chair

A convenient attachment for the back of a chair is an extension padded to form a comfortable headrest. This may be made by fixing a padded piece of wood, 6 in. wide and 20 in. long, to the chair back by means of suitable wooden braces, notched to fit the top of the chair.

Rigging Economizes Space in Closet

It was necessary to store a considerable quantity of clothing in a small clothes closet, and the rigging detailed in the illustration was devised, and provided unusual accommodations. Wooden rods, 1½ in. in diameter, were set across the closet at each side of the door and supported on notched blocks, as shown in the detail at the left. The clothes used frequently were supported on these rods by means of hangers. For clothes out of season, or used only occasionally, a special rigging was arranged in the space above the door. A 1½-in. rod was fitted between the walls to slide in a groove at its ends. Strips nailed to the wall formed the groove. Cords, attached to the rod, as shown, and carried to the ceiling, where pulleys were fixed, made it convenient to raise or lower the rod. A



This Simple Rigging Gave Accommodation for a Large Quantity of Clothing in a Small Closet

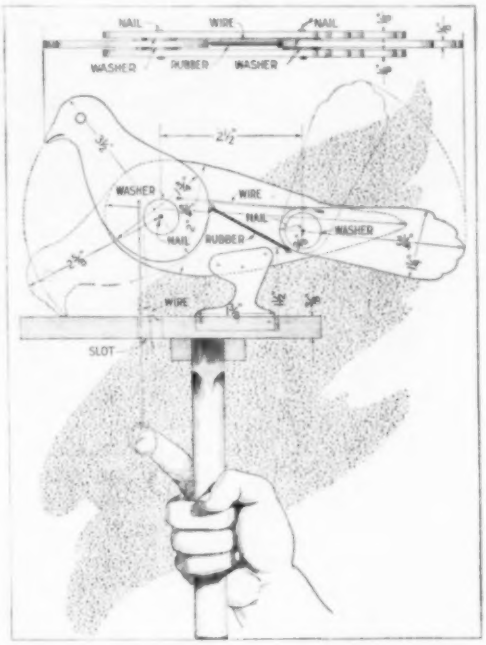
sheet was spread over the clothes to protect them.—A. K. Hay, Ottawa, Canada.

Scoop Made of Box End

A scoop that is serviceable for handling various kinds of lighter bulk material may be made by cutting the end from a cardboard box of suitable size and trimming it into shape. A handle may be provided by making a loop of cloth, or flexible cardboard, and fastening it with a paper fastener.

Mechanical Toy Pigeon Made of Wood

When the head of the mechanical pigeon is lowered the tail rises, and



Draw on the Wire and the Head and Tail Bob Up and Down

the reverse. It is constructed as follows: Make paper patterns for the parts, which consist of two body pieces, a head, a tail, and the foot piece. The shape of the parts is shown in the sketch, the front body piece being removed to show the connections of the rubber and wire controlling the movements. The view above shows the fastening of the parts with nails. The main sizes of the parts, which are made of ⅛ to ¼-in. soft wood, are: head, 1¾ by 3½ in.; body, 2 by 5¼ in.; tail, 1¼ by 3¼ in.; foot piece, 1⅜ by 1½ in. Mark the shapes on the wood, cut them out, and mount them, with a rubber band connecting the head and tail, as shown. Nail the foot piece between the body pieces, and pivot the head and tail on nails. Connect the head with a wire, having a loop on one end. Make the holder, and cut a slot into it for the draw wire, operated with the finger.—C. C. Wagner, Los Angeles, Calif.

Sportsman's Cabinet for Guns, Equipment, and Books

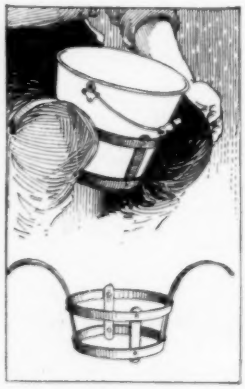
The books, magazines, guns, fishing tackle, camera, etc., of the out-of-door man are often kept or laid aside in various places. To provide a good place for such equipment, I made the case shown. What apparently is a neat bookcase when closed, the top shelf used as a magazine rack, accommodates numerous other articles. After the "bookcase" has been examined superficially I open the door, swing the shelves out, and display back of them my guns, hunting togs and outfit. Two small drawers, covered by the upper rail of the door when closed, hold various small articles; and a blind drawer under the door holds shoes and the larger articles. I constructed this combination cabinet as follows: The lumber used was ⅞-in. chestnut. The dimensions of the cabinet are 60 by 30 by 14 in. For the back of the bookshelf and cabinet I used matched ceiling. The door casings are 4 in. wide; the sidepieces of the door are 3 in. wide, the top, 4 in., and bottom piece, 6 in. wide. This cabinet cost me less than $3 and does the service of a gun cabinet valued at $30.—F. E. Brimmer, Dalton, N. Y.

A Photographic-Negative Filing System

In order to preserve photographic negatives and to make them easily available, the following homemade system was devised: The negatives are kept in envelopes having a print from the negative therein mounted on the face. A trial, or an inferior, print is used, and shows what negative it contains. Extra prints and enlargements are kept in the same envelope for each negative. On the face, or back, of the envelope is written data, such as name or title of subject, place and date taken, stop and shutter speed used, most suitable printing paper, developer, etc. This data may be kept in the negative envelope on a sheet of paper. This leaves the photograph album free from data that is of no interest to persons viewing the pictures. The envelopes are kept in their original boxes, classified as "Animals," "Birds," "Live Stock," "Landscapes," "My 1914 Vacation Trip," and so forth.

Knee-Rest Holder for Milking Pail

Becoming tired of holding the milk pail between my knees while milking, I made a contrivance of strap iron to overcome this. It is arranged so that the milk pail will just fit inside, the curved straps supporting the weight of the pail on the knees. The holder may be made of wood, with the possible exception of the curved arms, which should be made of pieces of iron, ⅛ in. thick and about 2 in. wide. The circular frame can be made adjustable to various pails by bolts set in holes in the bands.—J. C. Whitescarver, Miami, Okla.

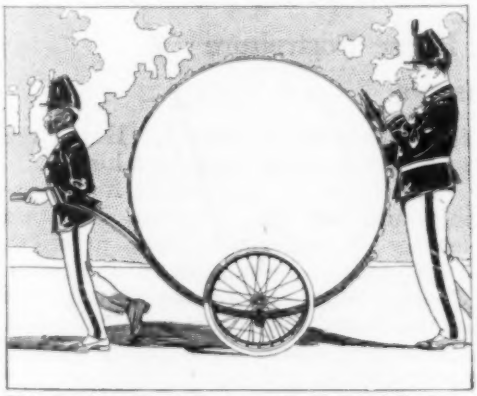


Tool Sockets in Edge of Drawing Board

Drawing tools, pencils, etc., were kept out of the way on a drawing board by inserting them in pockets drilled in the upper edge of the drawing board. A small brass plate, pivoted on the center, was used to cover each set of two pockets, and the latter were numbered on the upper surface of the board.—Elmer O. Tetzlaff, De Pere, Wis.

Cart for Carrying Huge Drum in Parade

The inalienable right of the small boy to carry the drum in a parade was disregarded when the cart shown in the sketch was made for a large drum. Two rubber-tired wheels were mounted on an axle bent to fit the drum, and curved handles, forming a supporting frame, were fixed to it. The frame was made of hickory, steamed

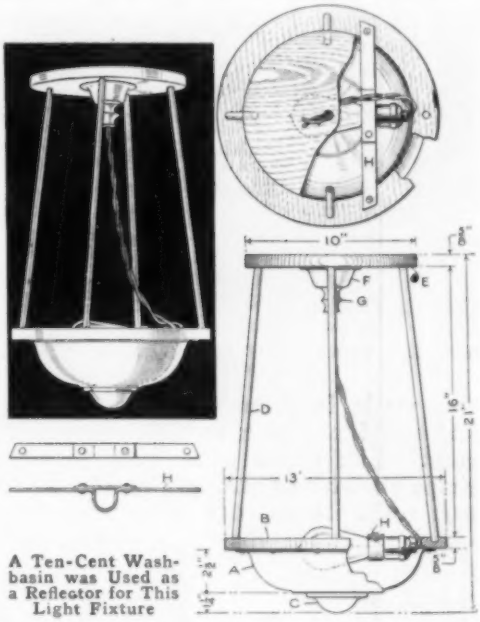


This Rubber-Tired Cart was Built Specially for a Large Drum Used in Parades

and bent into shape, and the drum was arranged to be quickly dismounted.—W. C. K., Mason City, Iowa.

A Homemade Inverted Electric-Light Fixture

An attractive and serviceable inverted-light fixture for a den and study was made at an outlay of about 30 cents, the details of construction being shown in the illustration. The light is distributed thoroughly, and with a 40-watt lamp is ideal for work at a desk. The lower portion A is a tin wash-basin, costing 10 cents, and the part



A Ten-Cent Wash-basin was Used as a Reflector for This Light Fixture

C is a cup-cake pan, costing 5 cents. The rim B is made of 5/8-in. wood, 13 in. in diameter, and the disk E, 10 in. wide, is the round block cut from the center of the rim B. The uprights D are made of 3/8-in. dowel rods and of a length suitable to the height of the room. They are glued and toenailed to the rim and disk. F is a cup-cake pan, and G is a drawer knob, fastened to the pan F. These parts can be omitted if desired. They are fastened to the top with wood screws.

The light socket is supported in a metal strap, H, having a rounded offset to match a bolted clamping strip. The inside of the basin, being tinned, acts as an excellent reflector. All parts except the inside of the pan are enameled white. The fixture is fastened to the ceiling with screws through the disk.—A. F. Krueger, Champaign, Ill.

¶The gummed portions of unsealed envelopes are often useful when a gummed strip is desired.

Wheelbarrow for Large Cans

Large cans for milk are awkward to handle and transport in the dairy or barn, and the cart shown in the sketch

Milk Cans were Handled Easily by Means of This Homemade Cart

was made from an old wheelbarrow and sections of pipe, to make this work easy. The pipes were bent to the shape shown and strongly braced with iron rods. A board bottom was provided, and the barrow wheel was mounted between the forked ends of the frame. The cart may be used for numerous other purposes, and is especially convenient in that the load need only be lifted slightly.—Monroe Woolley, San Francisco, Calif.

Plain Butts Used as Double-Swing Hinge

By placing two ordinary plain butt hinges so that two of their wings overlap completely, they may be made to serve as a double-swing hinge. If the holes do not correspond in the adjoining wings, drill new ones, disposing them to give the best hold in the wood. Allowance must be made in applying the hinge, for the double thickness of the center portion.

¶A rubber finger tip is convenient in counting sheets in that the paper is not soiled, since moistening of the finger is unnecessary.

Portable Skylight for Home Portraiture

By W. W. IRVINE

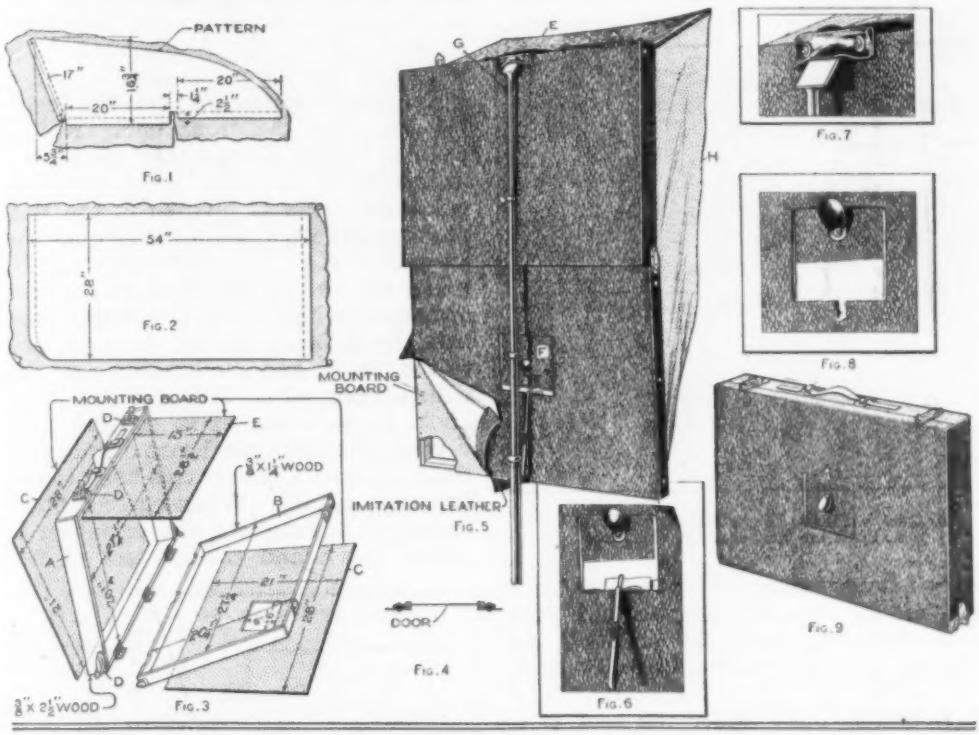
Photographers who wish to construct a part of their equipment may be interested in a portable skylight, which I made and use with thorough satisfaction, for home portraiture. Covered with imitation leather, it is quite presentable in carrying it about. Figure 9 shows the case closed, with stand, flash lamp, box of flash powder, and a white-cloth reflector inside. The apparatus set up for work is shown in Fig. 5, and the details of construction in the other sketches.

First make the frames for the top and bottom of the case, A, of ⅜ by 2½-in. wood, and B, of ⅜ by 1¼-in. stock, lengths and construction as shown in Fig. 3. Cut from extra-heavy mount board, two 21 by 28-in. pieces, C, and tack one to one side of each of the frames. Cut a similar piece, E, 15 by 26½ in., and hinge it with strong cloth, or thin leather, to the inner side of the thicker frame, to form the roof E, Fig. 5. Hinge the two frames with three butt hinges.

The frame is then ready for covering, and for this purpose imitation leather is economical and practical. Two yards of 36-in. material is needed. Use hot glue, first on the bottom half of the case, applying it smoothly, and press the fabric into place. Then cover the sides, the upper half, and the roof. The covering must be in one piece to prevent the smoke from escaping at the joints. Glue down the edges inside of the case, and set it aside for 24 hours to dry.

While waiting for the case to dry, the work on the bag can be done. Two yards of close-woven white muslin, or one yard of 60-in. sheeting, is required for the front. For the sides, close-woven black material should be used. Figures 1 and 2 show the dimensions, the white portions representing patterns, and the shaded portions mate-

rial for hems and seams. The material is folded over the pattern, basted down, and hemmed at the dotted lines, in Figs. 5 and 6. Mine was made for cartridges, but by attaching a pan of heavy tin, I use it for flash powder.



This Homemade Skylight was Made at a Cost of $3, Gives Satisfactory Service, and Is Not Unsightly

1½ in. from the edge. Sew the front to the curved sides. Allowance for shrinkage, when the bag is washed and fireproofed, has been made in these sizes.

For fireproofing the bag, the following formula is good: water, 60 oz., ammonium phosphate, 4 oz., ammonium chloride, 8 oz. Soak the fabric half an hour, wring it out slightly, and hang it up to dry.

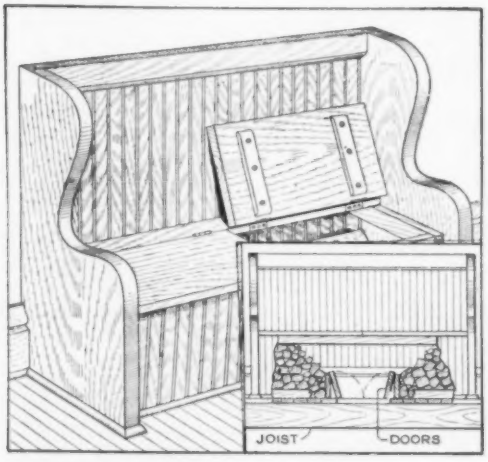
Cut a hole, 6 in. square, in the lower half of the case for the door F, Fig. 5. The door is of galvanized sheet iron, 7 in. square, covered on one side with imitation leather and provided with a leather handle. The door slides in guides of mount board, or metal, as shown in Fig. 4. Figure 8 shows the notch below the door to allow play for the spring of the flash lamp, in place

The leather socket, into which the top of the holder G, is slipped, is shown in detail in Fig. 7. Suitcase catches, D, lock the apparatus in open or closed position. The roof E, is supported by two folding desk slides.

To fasten the bag in place, slip a cheap yardstick, or strip, cut to the proper length, in each of the hems at the edges, and set them snugly inside and against the sides of the open case and under the edge of the roof. Fasten them with screws, as shown at the edges in Fig. 5. The bag is easily removed by withdrawing the screws and the strips, for washing and fireproofing it again. The front must hang away from the lamp before the charge is fired, or the bag may be burned. After firing the flash, the skylight is carried out and the smoke expelled.

Fuel Box in Seat Filled from Floor Trapdoor

A fuel box for the fireplace may be easily arranged so that it is unnecessary to carry the fuel through the living rooms, thus avoiding soiling floors and rugs. It may be installed, as shown, for a summer cottage, or even in the living room of a home. The fuel box is built under the seat of a comfortable settle, and the wood, coal, etc., are placed in the fuel compartment by passing it up through trapdoors in the floor at the center of the box. The fuel is piled at each side of the trapdoor behind a low partition, and the trapdoors are closed when not in use. The seat of the fuel box is divided at the middle and hinged to swing back. Suitable cushions should be provided for the seat.—M. P. Norton, Chicago.

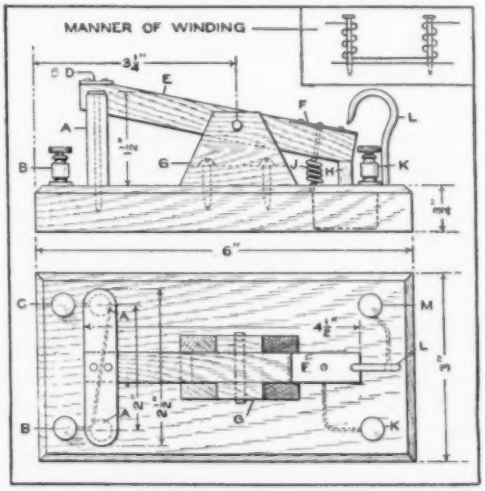


The Fuel is Placed in the Box by Passing It Up through the Trapdoors in the Floor

Homemade Relay of Inexpensive Materials

A practical relay was made of odds and ends gathered in the workshop. The base is of wood, ¾ by 3 by 6 in. The magnets A are made of two wire nails driven into the base, the heads projecting 1½ in. They are wound with six layers of fine insulated No. 25 gauge wire, as shown in the small sketch. The ends of these magnet wires are carried to the two binding posts B and C, taken from dry-cell carbons.

The armature D is a piece of soft iron, ½ by 2½ in., screwed to the armature lever E, which is a ½ by 4½-in. piece of wood. A piece of tin is tacked to the opposite end F, and a ⅛-in. hole is bored through the lever, 2½ in. from the front end. Nail a wooden block, G, to the base, slotted to accommodate the lever, so that when the latter is pivoted in the slot, the armature will lie directly over the magnet heads. Fit a wooden stop, H, under the end of the lever, so that the armature is held ⅛ in. above the magnets, by a brass spring, J, connected to the tin, F, and the binding post, K, with copper wire. Arrange the brass hook, L, so it comes in contact with F when the armature bears down upon the magnets. Connect this hook to the binding post, M. When current flows through the magnets, the armature is pulled down and the contact of the hook, L, with the tin, F, completes a secondary circuit.—L. R. Hardins, Harwich, Mass.



Nails, a Screw Hook, and Similar Common Materials, were Used in Making This Relay

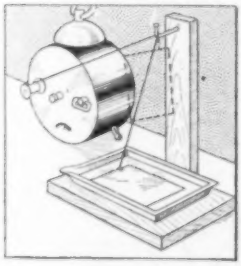
¶A nutcracker may be used as a substitute for a pipe wrench or pliers, and its toothed handles grip round objects quite firmly.

Uses for Worn Talking-Machine Needles

Among the uses made of discarded steel talking-machine needles are the following: as glazier's tacks; as brads, where a headless nail or an inconspicuous one is desired; as pins for fastening papers together; and for the tacking in of the backs on picture frames.—William A. Martin, Jersey City, N. J.

Automatic Photo-Print Washing Device

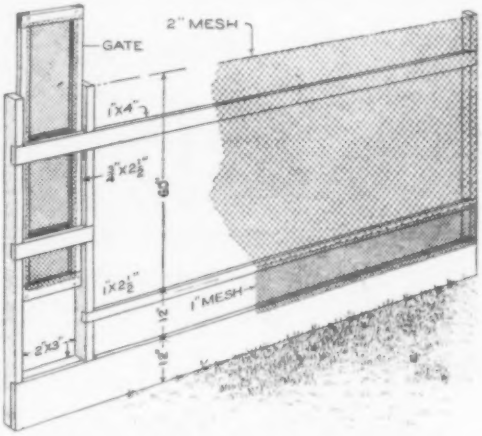
A photographers' automatic print-washing device may readily be made with the aid of an alarm clock, and a spool to which a piece of thread is attached as shown. The spool is fixed to the alarm-clock winder. An upright support, having a nail driven into the top and bent over to form a hook, carries the thread, to which the print is attached by a small clip. The alarm-clock mechanism is then set, and when released draws the print from the dish, the bell warning the operator.—George H. Holden, Chesterfield, England.



Portable Sectional Poultry Fencing

Sectional poultry fencing has several advantages over stationary fencing: It can be easily moved, the poultry yard being made larger, smaller, or shifted; an area may be planted to a crop and gradually included in the yard, furnishing greens for the poultry. Also, the tenant who does not care to put down permanent equipment, will find sectional fencing desirable.

Sections are practical to about 18 ft. long, and should be 7 ft. high for the lighter breeds of poultry. If the fencing is to be used for grown stock only, the fine-mesh wire below may be omitted, and 2-in. mesh used. Some sections should be fitted with gates, and the top batten should be set down

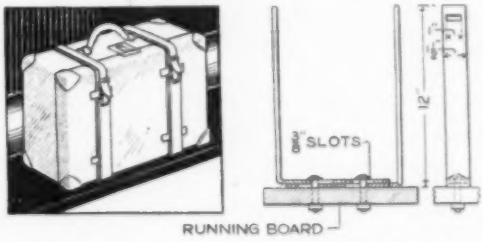


Poultry Fencing Made in Portable Sections Has Several Advantages over a Stationary Barrier

about 1 ft., so as not to afford footing for the poultry. The sections are lashed together with wire, and supported by an occasional post, or guyed to buildings or supports.

Suitcase Holder for Running Board of Automobile

Two metal strips, 3/16 by 1½ by 20 in., were used to make a strong and adjustable holder for suitcases carried on the running board of an automobile. One-inch slots were cut near the top of the strips, which were bent to form angles having an upright portion 12 in.



These Homemade Supports Are Adjustable to Suitcases of Varying Widths

long. The angles are adjusted at the bolts, as shown, and the suitcase is held in place by straps.—Lucien G. Baer, Los Angeles, Calif.

See Page 646

TWO INEXPENSIVE PUBLIC BUILDINGS WORTH NOTICE

Above is Shown the Schoolhouse and Below the Post Office at Estes Park, Colorado: These Buildings Are Worth Studying, for Neither of Them Cost the Village a Fortune and Both of Them Are Vastly More Attractive than Hundreds of Public Structures of Many Times Their Valuation

NOW and then one finds a small town blessed with public buildings that are a credit to the intelligence and taste of the community. That is, buildings whose cost is commensurate with the financial rating of the village, whose architecture is sufficiently divorced from monotony to be attractive, and whose capacity is adequate for present and near-future needs. Two structures of this sort, one a schoolhouse and the other a post office, are to be seen at Estes Park, a resort place in the Colorado mountains, 75 miles or so from Denver. Both of the buildings are constructed of native bowlders and stucco, and while neither is the least original architecturally, the effect in each case is kind to the eyes. Conditions in Estes Park are different from those in most small towns. The year-around population, for instance, is not more than 400, while some 8,000 or 10,000 persons reside in the vicinity during the summer months. In winter the school is attended by about 50 pupils of various ages, but in summer it serves as a kindergarten for tourists' children. Likewise the post office handles a sack or two of mail winter days and 30 or more of them later on. The spacious porch affords a resting place in summer for persons waiting for mail to be sorted. This building was erected by the villagers, 46 men and women contributing the money and labor that entered into its construction.

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